

The Keadby Next Generation Power Station Project

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The Keadby Next Generation Power Station Development Consent Order [year]

Land at, and in the vicinity of, the existing Keadby Power Station (Trentside, Keadby, Scunthorpe DN17 3EF)

Habitats Regulations Assessment Appropriate Assessment

The Planning Act 2008

The Infrastructure Planning (Environmental Information Assessment) Regulations 2017

Applicant: Keadby Next Generation Limited

Date: ~~August 2025~~ February 2026

Glossary

Abbreviation	Description
AADT	Annual Average Daily Traffic - a measure of the total volume of vehicle traffic of a highway or road for a year divided by 365 days
ADMS	Atmospheric Dispersion Modelling System - a proprietary model for the assessment of effect of emissions to air from point sources and road sources
AIA	Atmospheric Impact Assessment
AIL	Abnormal Indivisible Load - a load that cannot be broken down into smaller loads for transport without undue expense or risk of damage. It may also be a load that exceeds certain parameters for weight, length and width
APIS	Air Pollution Information System - provides a comprehensive source of information on atmospheric pollution and the effects on habitats and species. It supports the assessment of potential effects of air pollutants on habitats and species.
Applicant	Keadby Next Generation Limited
BAT	Best Available Techniques
CCGT	Combined Cycle Gas Turbine – a CCGT is a combustion plant where a gas turbine is used to generate electricity and the waste heat from the flue-gas of the gas turbine is converted to useful energy in a heat recovery steam generator (HRSG), where it is used to generate steam. The steam then expands in a steam turbine to produce additional electricity
CEMP	Construction Environment Management Plan - a plan to outline how a construction project will avoid, minimise or mitigate effects on the environment and surrounding area
CERC	Cambridge Environmental Research Consultants
CIEEM	Chartered Institute of Ecology and Environmental Management
CJEU	Court of Justice of the European Union - interprets EU law to ensure it is applied in the same way in all EU countries.
DCO	Development Consent Order - made by the relevant Secretary of State pursuant to the Planning Act 2008 to authorise a Nationally Significant Infrastructure Project. A DCO can

Abbreviation	Description
	incorporate or remove the need for a range of consents which would otherwise be required for a development. A DCO can also include rights of compulsory acquisition
EC	European Commission - the executive branch of the European Union.
EclA	Ecological Impact Assessment - a process by which the potential ecological impacts of a development proposal are assessed.
EEA	European Economic Area - allows countries to be part of the EU's single market
EIA	Environmental Impact Assessment - a term used for the assessment of environmental consequences (positive or negative) of a plan, policy, program or project prior to the decision to move forward with the proposed action.
ES	Environmental Statement – a report in which the process and results of an Environment Impact Assessment are documented.
EU	European Union - an economic and political union of 27 countries.
HGV	Heavy Goods Vehicle - vehicles with a gross weight in excess of 3.5 tonnes.
HRA	Habitats Regulations Assessment – the assessment of the impacts of implementing a plan or policy on a Natura 2000 European site required under the The Conservation of Habitats Directive and Species Regulations 2017 (as amended) .
INNS	Invasive Non-native Species - species established outside of their natural range and which considered damaging for native biodiversity and/or to economic activities.
IROPI	Imperative Reasons of Overriding Public Interest.
Km	Kilometre – unit of distance.
kV	Kilovolt – unit of voltage.
LSE	Likely Significant Effects.
MW	Megawatt – unit of power.

Abbreviation	Description
NLC	North Lincolnshire Council – the local planning authority with jurisdiction over the area within which the Keadby Power Station Site and Proposed Development Site are situated.
NPPF	National Planning Policy Framework - The NPPF is part of the Government's reform of the planning system intended to make it less complex, to protect the environment and to promote sustainable growth. It does not contain any specific policies on Nationally Significant Infrastructure Projects, but its policies may be taken into account in decisions on DCOs if the Secretary of State considers them to be both important and relevant.
NSIP	Nationally Significant Infrastructure Project - defined by the Planning Act 2008 and cover projects relating to energy (including generating stations, electric lines and pipelines); transport (including trunk roads and motorways, airports, harbour facilities, railways and rail freight interchanges); water (dams and reservoirs, and the transfer of water resources); waste water treatment plants and hazardous waste facilities. These projects are only defined as nationally significant if they satisfy a statutory threshold in terms of their scale or effect.
NSR	Noise Sensitive Receptors - locations or areas where dwelling units or other fixed, developed sites of frequent human use occur which may be sensitive to noise impacts.
PC	Process Contribution - represents the change caused by the Proposed Development.
PEI	Preliminary Environmental Information – the information referred to in section 14(2) of the EIR Regulations that has been reasonably compiled by the applicant and is reasonably required to assess the environmental effects of a development project.
PINS	Planning Inspectorate – executive agency of the Ministry of Housing, Communities and Local Government of the United Kingdom Government.
PV	Photovoltaic - captures the sun's energy and convert it into electricity
RDF	Refuse Derived Fuel - produced from domestic and business waste, which includes biodegradable material as well as plastics.

Abbreviation	Description
SAC	<p>Special Area of Conservation — high quality conservation sites that are protected under the European Union Habitats Directive due to their <u>make a significant contribution to conserving these habitat types that are considered to be most</u> the habitats and species identified in need <u>Annexes I and II of</u> conservation. <u>European Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive. They are designated in England under The Conservation of Habitats and Species Regulations 2017 (as amended).</u></p>
SPA	<p>Special Protection Area – strictly protected sites classified <u>areas for birds that are designated in accordance with Article 4</u> England under The Conservation of the EC Birds Directive. Special Protection Areas are Natura sites which are internationally important sites for the protection of threatened <u>Habitats and species.</u> Species Regulations 2017 (as amended).</p>
WFD	<p>Water Framework Directive—European Union directive which commits member states to achieve good qualitative and quantitative status of all water bodies — <u>Water Framework Directive – affords protection to surface waters including rivers, lakes, transitional waters (also referred to as estuarine waters), coastal waters and groundwater. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 transpose the Water Framework Directive into UK law.</u></p>

Contents

GLOSSARY	1
CONTENTS.....	5
1. EXECUTIVE SUMMARY	7
2. INTRODUCTION.....	9
2.1. OVERVIEW.....	9
2.2. THE APPLICANT	9
2.3. THE PROPOSED DEVELOPMENT.....	10
2.4. THE PROPOSED DEVELOPMENT SITE.....	12
2.5. THE DCO PROCESS	13
2.6. THE PURPOSE AND STRUCTURE OF THIS DOCUMENT	14
3. LEGISLATIVE CONTEXT	17
4. METHODOLOGY.....	20
4.1. GENERAL APPROACH.....	20
4.2. HRA STAGE 1 - SCREENING FOR LIKELY SIGNIFICANT EFFECTS	21
4.3. HRA STAGE 2 - APPROPRIATE ASSESSMENT	22
4.4. THE ROCHDALE ENVELOPE.....	22
4.5. INTERACTION WITH OTHER COMPETENT AUTHORITIES.....	23
4.6. CONSULTATION WITH NATURAL ENGLAND AND/ OR GENERAL PUBLIC ...	23
5. BASELINE EVIDENCE GATHERING	25
5.1. SCOPE	25
5.2. RELEVANT EUROPEAN SITES.....	25
5.3. HUMBER ESTUARY SAC, SPA AND RAMSAR SITE	26
5.4. THORNE MOOR SAC, HATFIELD MOOR SAC AND THORNE AND HATFIELD MOORS SPA	34
6. TEST OF LIKELY SIGNIFICANT EFFECTS	37
6.1. OVERVIEW.....	37
6.2. CONSTRUCTION	37
6.3. OPERATION	60
6.4. DECOMMISSIONING	76
7. APPROPRIATE ASSESSMENT.....	79
7.1. IMPACT PATHWAYS SCREENED IN FOR APPROPRIATE ASSESSMENT	79

7.2. NOISE AND VISUAL DISTURBANCE OF QUALIFYING BIRD SPECIES DURING THE CONSTRUCTION PERIOD	79
8. IN-COMBINATION EFFECTS WITH OTHER PLANS OR PROJECTS	106
9. CONCLUSIONS.....	108
10. REFERENCES.....	109
APPENDIX A SUMMARY TABLE OF THE RELEVANT EUROPEAN SITES, QUALIFYING FEATURES, PATHWAYS AND DESIGNATIONS	114
APPENDIX B CITATIONS AND NATURA 2000 DATA SHEETS FOR THE RELEVANT EUROPEAN SITES	119
APPENDIX C CONSERVATION OBJECTIVES FOR THE RELEVANT EUROPEAN SITES	121
APPENDIX D BTO BIRD DATA REPORT AND TECHNICAL NOTE	123
APPENDIX E OTHER PLANS AND PROJECTS OF POTENTIAL RELEVANCE TO THE IN-COMBINATION ASSESSMENT	8

Tables

Table 1 - Threats/ Pressures Identified by Natural England in Relation to the Humber SAC and SPA and the Relevance of these to the Proposed Development.....	31
Table 2 - Threats/ Pressures Identified by Natural England in Relation to the Thorne and Hatfield Moors Designations and the Relevance of these to the Proposed Development.....	35

1. Executive Summary

1. This Habitats Regulation Assessment (HRA) Appropriate Assessment Report has been prepared by AECOM Ltd (AECOM) on behalf of Keadby Next Generation Ltd ('The Applicant') in relation to an application for development consent ('the Application') for the construction, operation and maintenance of a proposed combined cycle gas turbine (CCGT) electricity generating station designed to run on 100% hydrogen (the ambition is that this would be the fuel used from inception) and able to run on 100% natural gas or a blend of natural gas and hydrogen ('Keadby Next Generation Power Station' referred to in this report as 'the Proposed Development'). The Proposed Development will be located on land at, and in the vicinity of, the existing Keadby Power Station, Trentside, Keadby, Scunthorpe DN17 3EF ('the Site').
2. This HRA Appropriate Assessment Report describes the legislation that underpins the requirement to complete a HRA and describes the methodology applied when making the assessment. The assessment provides a screening of the Likely Significant Effects of the Proposed Development during construction, operation and decommissioning on the following European Sites:
 - Humber Estuary SAC;
 - Humber Estuary SPA;
 - Humber Estuary Ramsar site;
 - Thorne Moor SAC;
 - Hatfield Moor SAC; and
 - Thorne and Hatfield Moors SPA.
3. The assessment examines the following potential impact pathways, as relevant to each European Site and each phase of the Proposed Development:
 - habitat disturbance and modification;
 - noise, vibration and visual disturbance of qualifying species features;
 - invasive non-native species;
 - atmospheric pollution;
 - water pollution;
 - temporary or permanent impacts on foraging resources for qualifying species features; and
 - mortality and barriers to lamprey movement.
4. The first stage of the assessment involved an assessment of Likely Significant Effects for each of the construction, operation and decommissioning periods. Following this initial assessment, no Likely Significant Effects were identified in relation to habitat disturbance and modification during all periods, invasive non-native species during all periods, atmospheric and water pollution during

construction and decommissioning, and mortality and barriers to lamprey movement during all periods.

5. The potential impact pathways of noise and vibration disturbance of qualifying species during construction, operation and decommissioning, ~~air~~ and atmospheric pollution during construction, operation and decommissioning, water pollution during operation, and impacts on the foraging resources of qualifying species during construction and decommissioning could not be screened out, so these were taken forward for the second stage of assessment, which is Appropriate Assessment. The Appropriate Assessment concluded **no adverse effect** on the integrity of the European Sites.
6. Potential in-combination effects of the Proposed Development with other plans and projects were also assessed and the same conclusion was reached i.e. **no adverse effect** on the integrity of the European Sites.

2. Introduction

2.1. Overview

- 2.1.1. This Habitats Regulation Assessment (HRA) Appropriate Assessment Report (**Application Document Ref. 5.2**) has been prepared by AECOM Ltd (AECOM) on behalf of Keadby Next Generation Limited ('the Applicant') which is a subsidiary of SSE plc. It forms part of the application for a Development Consent Order (DCO) ('the Application'), that has been submitted to the Secretary of State (SoS) for Energy Security and Net Zero under Section 37 of 'The Planning Act 2008'.
- 2.1.2. The Applicant is seeking development consent for the construction, operation and maintenance of a new combined cycle gas turbine (CCGT) electricity generating station on land at, and in the vicinity of, the existing Keadby Power Station, Trentside, Keadby, Scunthorpe DN17 3EF ('the Site').
- 2.1.3. The Keadby Next Generation Power Station ('the Proposed Development') is a new CCGT electricity generating station with a capacity of up to 910MW electrical output. The CCGT electricity generating station will be designed to run on 100% hydrogen and able to run on 100% natural gas or a blend of natural gas and hydrogen and will be located on land to the west of Keadby 1 and Keadby 2 power stations. The Proposed Development includes connections for cooling water, electricity, hydrogen, natural gas and construction laydown areas and other associated development. It is described in full in **Environmental Statement (ES) Volume I Chapter 4: The Proposed Development (Application Document Ref 6.2)**
- 2.1.4. The Proposed Development falls within the definition of a 'Nationally Significant Infrastructure Project' (NSIP) under Section 14(1)(a) and Sections 15(1) and (2) of the 2008 Act, as it is an onshore generating station in England that would have a generating capacity greater than 50MW electrical output (50MWe). As such, a DCO application is required to authorise the Proposed Development in accordance with Section 31 of the 2008 Act.
- 2.1.5. The DCO, if made by the SoS, would be known as 'The Keadby Next Generation Power Station Order' ('the Order').

2.2. The Applicant

- 2.2.1. The Applicant is a subsidiary of the FTSE-listed SSE plc, one of the UK's largest and broadest-based energy companies, and the country's leading developer of renewable energy. The Proposed Development is being

developed with Equinor, one of the country's leading energy providers, supplying natural gas, oil and electricity. It is developing multiple low-carbon hydrogen and carbon capture projects in the Humber, working towards transforming the UK's most carbon intensive industrial cluster into a net zero region. Over the last 20 years, the SSE Group has invested over £20bn to deliver industry-leading offshore wind, onshore wind, CCGT, energy from-waste, biomass, battery-storage, energy networks and gas storage projects. Related SSE companies own and operate the adjacent Keadby 1 and 2 Power Stations and have the benefit of the DCO for Keadby 3 CCS Power Station (herein referred to as the 'Keadby CCS Power Station').

- 2.2.2. SSE Renewables Limited operates Keadby Windfarm, which lies to the north and south of the Site and generates renewable electricity from 34 turbines, with a total installed generation capacity of 68MW.
- 2.2.3. SSE plc has produced a 'Greenprint' document (SSE, 2020) that sets out a clear commitment to investment in low carbon power infrastructure, working with government and other stakeholders to create a Net Zero power system by 2040. This includes investment in flexible sources of electricity generation and storage for times of low renewable output which will complement other renewable generating sources, either using low-carbon fuels and/ or capturing and storing carbon emissions.
- 2.2.4. The design of the Proposed Development demonstrates the commitment outlined within the Greenprint. The Proposed Development will be built with a clear route to decarbonisation, consistent with SSE's Net Zero Acceleration Plan which committed to the development and progression of new low-carbon flexible power including hydrogen-fuelled generation.

2.3. The Proposed Development

- 2.3.1. The Proposed Development would comprise a high efficiency gas fired power station with a gross electrical output capacity of up to 910MWe and associated buildings, structures and plant and other associated development defined in the Schedule 1 of the draft DCO (**Application Document Ref. 3.1**) as Work No. 1-11 and shown on the Works Plans (**Application Document Ref. 2.3**).
- 2.3.2. The Proposed Development will include:
- a new-build CCGT electricity generating station fuelled by hydrogen and/or natural gas with a power output of up to 910MW (**Work No. 1**) including:
 - a CCGT plant;
 - cooling infrastructure;

- natural gas and hydrogen blending equipment (for the Applicant’s infrastructure);
- supporting facilities including administration and control buildings, workshops, storage buildings, effluent treatment facilities, fire water storage tank(s), demineralised water treatment plant including storage tank(s), and permanent laydown areas for operation and maintenance activities;
- a hydrogen supply pipeline, including a gas compound for the hydrogen supplier’s apparatus and a hydrogen gas compound for the Applicant’s apparatus (**Work No. 2**);
- a natural gas supply pipeline including a compound for the natural gas supplier’s apparatus and a natural gas compound for the Applicant’s apparatus (**Work No. 3**);
- electrical connection works for the export and import of electricity to and from the generating station to the existing 400kV National Grid Electricity Transmission (NGET) substation located adjacent to the Keadby Power Station site, including works within the substation (which would be undertaken by NGET) (**Work No. 4**);
- water supply connection works to provide cooling and make-up water to the generating station, including intake structures and an underground and/or overground water supply pipeline running between the generating station and the Stainforth and Keadby Canal (**Work No. 5**);
- connections to and use of an existing outfall and associated pipework for the discharge of used cooling water, surface water and treated effluent to the River Trent (**Work No. 6**);
- public water connection pipeline from a new connection on Chapel Lane to provide potable water to the generating station (**Work No. 7**);
- new permanent access to the generating station (**Work No. 8**), comprising:
 - maintenance and improvement of an existing private access road from the A18, including replacement of a private bridge (Mabey Bridge) (**Work No. 8A**);
 - installation of layby and gatehouse with barriers, enclosures, drainage and lighting north of the A18 junction (**Work No. 8B**) and associated utilities connections (**Work No. 8C**); and
 - emergency access route comprising the maintenance and improvement of an existing private track running between the generating station and Chapel Lane and including new private bridge crossing (**Work No. 8D**);
- temporary construction and laydown areas (**Work No. 9A**);

- maintenance and improvement of the existing paved haulage routes running between the A18 and construction laydown areas (**Work No. 9B**); and the track between skew bridge adjacent to the A18 and a temporary construction laydown area associated with Mabey Bridge replacement (**Work No. 9C**);
- retention, maintenance and improvement and subsequent removal of existing temporary haulage route from the Waterborne Offloading Facility (**Work No. 9D**) and the inspection and repair of the existing jetty, and temporary placement of mobile cranes including the temporary oversailing of crane arms (**Work No. 9E**); and
- landscaping and biodiversity enhancement measures (**Work No. 10**);
- an allocation of land to meet the requirements of the Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013 (**Work No. 11**).

- 2.3.3. The Applicant will be responsible for the construction and operation (including maintenance) and eventual decommissioning of the Proposed Development including the on-site connections to electricity, cooling water, natural gas and hydrogen supplies.
- 2.3.4. The Proposed Development will be capable of operating 24 hours per day, 7 days per week with programmed offline periods for maintenance.
- 2.3.5. The route for the hydrogen supply pipeline to the Proposed Development has not yet been confirmed. The supply pipeline is not included in the Proposed Development and will be progressed by a third party under a separate consent. In line with Government policy, it is recognised that developments such as the Proposed Development are needed to stimulate investment in the development of hydrogen production and supply infrastructure.
- 2.3.6. Further detail on the components of the Proposed Development are provided in **ES Volume I Chapter 4: The Proposed Development (Application Document Ref. 6.2)**. The areas within which each numbered Work (component) of the Proposed Development are to be built are defined by the coloured and hatched areas on the Works Plans (**Application Document Ref. 2.3**).

2.4. The Proposed Development Site

- 2.4.1. The Site is located within and near to the existing Keadby Power Station site near Scunthorpe, Lincolnshire and lies within the administrative boundary of North Lincolnshire Council (NLC). The majority of land is

within the ownership or control of the Applicant (or SSE associated companies) and is centred on national grid reference 482351, 411796.

- 2.4.2. The existing Keadby Power Station site currently encompasses the operational Keadby 1 and Keadby 2 Power Station sites, including the Keadby 2 Power Station Carbon Capture and Readiness reserve space.
- 2.4.3. The Site encompasses an area of approximately 77.1 hectares (ha), of which approximately 26.7ha of land is proposed for construction laydown.
- 2.4.4. Multiple proposed land uses together make up the Site, with the different areas described in turn below and shown on **ES Volume III Figure 3.3** Indicative Parts of the Site Plan (**Application Document Ref. 6.4**). These terms have been used to describe land use zones within the Site.
- 2.4.5. The Site is divided into the following areas of permanent and temporary land use (the proposed use is described in more detail in **ES Volume I Chapter 3: Site and Surrounding Area (Application Document Ref. 6.2)**):
- Main Site;
 - Ancillary Facilities
 - Water Connections;
 - Electricity Connections;
 - Waterborne Transport Off-loading Area;
 - Construction Laydown Areas;
 - Access routes (emergency, permanent and construction);
 - Connections to Keadby 1 and Keadby 2 power stations; and
 - Additional areas for landscaping and biodiversity provision.

2.5. The DCO Process

- 2.5.1. The Proposed Development falls within the definition of a 'nationally significant infrastructure project' (NSIP) under Section 14(1)(a) and 15(2) of the 2008 Act as a 'generating station exceeding 50 MW'.
- 2.5.2. As an NSIP project, the Applicant is required to obtain a DCO to construct, and operate the generating station, under Section 31 of the 2008 Act. Section 37 of the 2008 Act also governs the form, content and accompanying documents that are required as part of a DCO application. These requirements are implemented through the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) ('APFP Regulations') which state that an application must be accompanied by an ES, where a development is considered to be 'EIA

development' under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) (as amended).

- 2.5.3. An application for development consent for the Proposed Development has been submitted to PINS acting on behalf of the Secretary of State. Subject to the application being accepted, PINS will then examine it and make a recommendation to the Secretary of State, who will then decide whether to grant a DCO. The acceptance, examination, recommendation and decision stages are subject to fixed timescales and the decision is therefore anticipated to fall in 2026.
- 2.5.4. A DCO, if granted, has the effect of providing planning consent for a development, in addition to a range of other consents and authorisations where specified within the Order.

2.6. The Purpose and Structure of this Document

- 2.6.1. When preparing a DCO application, applicants need to consider the potential effects of the application on protected habitats designated as European Sites¹. In accordance with Government policy (Planning Inspectorate, 2024) European Sites, including European Marine Sites, are taken to encompass the following kinds of nature conservation designation: Special Areas of Conservation (SAC), candidate SAC (cSAC), possible SAC (pSAC), Special Protection Areas (SPA), potential SPA (pSPA), Ramsar sites, and areas identified or required to compensate for damage to a European site.
- 2.6.2. This HRA Appropriate Assessment Report has been prepared to meet this requirement. It has been prepared in accordance with PINS's 'Nationally Significant Infrastructure Projects Advice Note on Habitats Regulations Assessments' (PINS, 2024).
- 2.6.3. If an NSIP, when taken alone or with existing and known future plans or projects, is likely to affect a European Site, the applicant must provide a report identifying the site together with sufficient information to enable the competent authority (which in this case is the Secretary of State) to make an Appropriate Assessment, if required, under the terms of Regulation 63 of The Conservation of Habitats and Species Regulations 2017 (as amended) (UK Government, 2017a) (commonly referred to as the

¹ Following the exit of the UK from the European Union, there has been a shift in terminology. Within England and Wales, European Sites (whilst still referred to as such in much of the published guidance) have been renamed as 'Habitats Sites'. For the purpose of this report, the established terminology, European Sites, has been used.

'Habitats Regulations'). Accordingly, the DCO application must include all such information as may reasonably be required:

“for the purposes of the assessment or to enable [the competent authority] to determine whether an appropriate assessment is required.” (Reg. 63(2))

2.6.4. This information is provided in this report.

2.6.5. The HRA Appropriate Assessment Report is structured as follows:

- Section 3 describes the legislation underpinning the requirement for this assessment;
- Section 4 describes the methodology applied when making the assessment;
- Section 5 defines the relevant European Sites and their qualifying features of interest;
- Section 6 provides a screening of the Likely Significant Effects of the Proposed Development during construction, operation and decommissioning;
- Section 7 examines in more detail the impact pathways that could not be screened out in Section 6 to provide an Appropriate Assessment;
- Section 8 provides an assessment of the potential in-combination effects of the Proposed Development with other plans and projects;
- Section 9 provides the conclusions of the assessment;
- Appendix A is the required (Planning Inspectorate, 2025) summary table of all European sites and qualifying features and each pathway of effect;
- Appendix B provides the relevant citations and/or Natura 2000 data sheets for the relevant European Sites;
- Appendix C provides the conservation objectives for the relevant European Sites;
- Appendix D provides desk study information on birds to support the assessment of the relevant pathways for impacts on birds;
- Appendix E provides the results of the air quality impact assessment (extracted from **ES Volume I Chapter 8: Air Quality (Application Document Ref. 6.2)**); and
- Appendix F identifies the plans and projects considered by the assessment of in-combination effects within Section 8.

2.6.6. This HRA Appropriate Assessment Report is supported by **Figure 1** which shows the location and layout of the Proposed Development, **Figure 2** which provides the locations of the European Sites that are assessed and **Figure 3**

which is provides a contour map showing the results of the construction noise modelling. **Figure 4** provides a contour map showing the results of the operation noise modelling.

3. Legislative Context

- 3.1.1. The need to undertake HRA is implemented in English and Welsh law by the Habitats Regulations. This, through Regulation 63, transposes into English law the requirements of the Habitats Directive (European Council Directive 92/43/EEC) (European Commission, 1992) and the Birds Directive (European Council Directive 2009/147/EEC) (European Commission, 2009).
- 3.1.2. The UK left the European Union (EU) on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2018 (UK Government, 2018). Through this Act, the body of existing EU-derived law within UK domestic law is retained. As such this assessment takes account of relevant EU case law.
- 3.1.3. The Habitats Regulations also apply the precautionary principle² to European Sites.
- 3.1.4. Over the years, the term HRA has become widely used to describe the overall process set out in the Habitats Regulations (as covered in Nationally Significant Infrastructure Projects Advice Note on Habitats Regulations Assessments' (Planning Inspectorate, 2024)). This has arisen to distinguish the overall process from the individual stage of 'Appropriate Assessment'; which is the latter stage and responsibility of the competent authority (the Secretary of State). Throughout this report the term HRA is therefore used for the overall process and use of the term Appropriate Assessment is restricted to the specific stage of that name.
- 3.1.5. Stage 1 of HRA (the test of 'Likely Significant Effects' also known as 'Screening') has been conducted and is provided within this report (refer to Section 6). This has been prepared having regard to relevant case law relating to the Habitats Regulations, the Habitats Directive and the Birds Directive. This includes the June 2018 ruling by the Court of Justice of the European Union (CJEU) in the case of People Over Wind, Peter Sweetman v Coillte Teoranta (C-323/17). This establishes (paragraph 40)

² The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation as: '*When human activities may lead to morally unacceptable harm [to the environment] that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis.*'

that 'mitigation measures' cannot be considered at the screening stage, but they can be considered in an Appropriate Assessment.

- 3.1.6. However, it has been clarified that features integral to the design or physical characteristics of the project that is being assessed, for example, the layout, timing and location of a scheme, may be considered at the screening stage (paragraph 007 of Ministry of Housing, Communities and Local Government, Ministry of Housing, Communities & Local Government (2018 to 2021) and Department for Levelling Up, Housing and Communities, 2019). In many cases the design or physical characteristics of the Proposed Development are constrained by legislation, licensing and permitting regimes such that the Proposed Development could not lawfully proceed if the requirements of these regimes are not met. Therefore, these requirements can also be considered at screening as they apply irrespective of the presence of European Sites.
- 3.1.7. Therefore, committed integral measures to address over-arching legal requirements that apply irrespective of any European Site designations and that preclude potential pathways for impact do not constitute mitigation intended to avoid potential harmful effects on European Sites. Therefore integral measures can be relied on for the purposes of habitats screening.
- 3.1.8. Should it be found that significant effects are likely, an 'Appropriate Assessment' should then be carried out in order to further assess those effects. Mitigation can be considered during Appropriate Assessment. Under Regulation 63 of the Habitats Regulations, it is required under Regulation 63(1) that:

“A competent authority, before deciding to ... give any consent for a plan or project which is likely to have a significant effect on a European site ... must make an appropriate assessment of the implications for the plan or project in view of that site’s conservation objectives.”

- 3.1.9. Further Regulation 63(5) states:

“In the light of the conclusions of the assessment ... the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site.”

- 3.1.10. If adverse effects are identified that cannot be mitigated, alternatives should be considered to avoid those effects. However, where no alternative solution exists and so an adverse effect remains, a further assessment should be made of whether the scheme is required for imperative reasons of overriding public interest (IROPI). If the scheme

meets that IROPI test, compensatory measures will be required in order to maintain the overall European Site status.

4. Methodology

4.1. General Approach

4.1.1. There is no guidance that dictates the scope of an HRA or for the relevant states thereof. Therefore, this HRA Appropriate Assessment Report has been prepared with reference, as relevant, to the following:

- Nationally Significant Infrastructure Projects: Advice on Habitats Regulations Assessments (Planning Inspectorate, 2024);
- Habitats Regulations Assessments: Protecting a European Site (Department for Environment, Food & Rural Affairs (Defra), Natural England, Welsh Government and Natural Resources Wales, 2023);
- Appropriate assessment. Guidance on the use of Habitats Regulations Assessment (Ministry of Housing, Communities and Local Government, Ministry of Housing, Communities & Local Government, 2018 to 2021, and Department for Levelling Up, Housing and Communities, 2019); and
- Guidelines on the assessment of transboundary impacts of energy developments on Natura 2000 sites outside the UK (Department for Energy Security and Net Zero, 2015).

4.1.2. HRA is a three stage process as follows (after Planning Inspectorate, 2024):

- **Stage 1: Screening** - a simple assessment to check or screen if the Proposed Development is directly connected with or necessary for the conservation management of a European Site, and if it risks having a significant effect on a European Site on its own or in combination with other proposals;
- **Stage 2: Appropriate Assessment** – this is required where likely significant effects on a European site or sites from the Proposed Development alone or in combination with other plans or projects, cannot be ruled out at Screening stage; and
- **Stage 3: Derogations** - where an adverse effect on the integrity of a European site cannot be ruled out, a proposal may be able to go ahead through a derogation under the Habitats Regulations.

4.1.3. The first stage of HRA involves screening of the Proposed Development (alone and in-combination with other plans and projects) concerned for 'Likely Significant Effects' (LSE) as described in Sections 6 and 8 of this

document. At this stage of HRA, options for the mitigation of LSE on European Sites cannot be considered.

- 4.1.4. During Appropriate Assessment (Section 7) consideration can be given to other relevant information and potential mitigation options. Consent may only be given for a proposed scheme if, following appraisal of mitigation measures, it is established that it will not adversely affect the integrity of the European Site or the IROPI test is met.
- 4.1.5. Whilst the HRA decisions must be taken by the competent authority, the information needed to undertake the necessary assessments must be provided by the Applicant. The summary information needed for the competent authority to establish whether there are any LSE from the Proposed Development is therefore provided in this report. This information has been compiled with reference to **ES Volume I Chapter 4: The Proposed Development, Chapter 8: Air Quality, Chapter 9: Noise and Vibration, Chapter 11: Biodiversity and Nature Conservation, Chapter 12: Water Environment and Flood Risk of the ES (Application Document Ref. 6.2).**

4.2. HRA Stage 1 - Screening for Likely Significant Effects

- 4.2.1. The objective of the LSE test is to ‘screen out’ those aspects of the Proposed Development that can, without any detailed appraisal or consideration of mitigation measures, be said to be unlikely to result in significant adverse effects upon European Sites. Usually this is achieved because there is no mechanism (‘pathway’) for an adverse interaction with the relevant European Sites (refer also to the legal basis for this as summarised in Section 3). Any remaining aspects are then taken forward to Appropriate Assessment.
- 4.2.2. The Proposed Development, alone or in combination with other proposals, could cause a significant effect on a European Site if there is (Defra, Natural England, Welsh Government and Natural Resources Wales, 2023):
- a reduction in the amount or quality of designated habitats or the habitats that support designated species;
 - a limit to the potential for restoring designated habitats in the future;
 - a significant disturbance to the designated species;
 - disruption to the natural processes that support the site’s designated features; and/or
 - only reduction or offset measures in place.

4.2.3. Where there are no LSE, either alone or in combination, then there is no requirement for Appropriate Assessment.

4.3. HRA Stage 2 - Appropriate Assessment

4.3.1. Where it is determined that a conclusion of 'no LSE' cannot be drawn, there is a need to proceed to the next stage of HRA known as Appropriate Assessment. Case law has clarified that Appropriate Assessment is not a technical term. In other words, there are no specific technical analyses, or level of detail, that are classified by law as belonging to Appropriate Assessment rather than the screening for LSE. The Appropriate Assessment constitutes whatever level of further assessment is required to determine whether an adverse effect on integrity would arise.

4.3.2. Because it follows the screening process, there is an implication that the analysis will be more detailed than undertaken at the previous stage. One of the key considerations during Appropriate Assessment is whether there is available mitigation that would entirely address the potential effect, allowing for a conclusion of no adverse effect on integrity of a European Site. In practice, the Appropriate Assessment takes any element of the Proposed Development that could not be dismissed following HRA Stage 1 and assesses the potential for an effect in more detail, with a view to concluding whether there would be an adverse effect on site integrity (i.e. disruption of the coherent structure and function of the European Site(s) and the ability of the site to achieve its conservation objectives).

4.4. The Rochdale Envelope

4.4.1. Within Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2018), the Planning Inspectorate explains how the principles of the Rochdale Envelope should be used within the EIA process.

4.4.2. The Rochdale Envelope is applicable where some of the details of the Proposed Development cannot be confirmed when an application is submitted, and flexibility is needed to address uncertainty. Notwithstanding, all significant potential effects of the Proposed Development must be adequately addressed.

4.4.3. It encompasses three key principles:

- the assessment should use a cautious worst-case approach;
- the level of information assessed should be sufficient to enable the LSE of a Proposed Development to be assessed; and
- the allowance for flexibility should not be abused to provide inadequate descriptions of projects.

4.4.4. This HRA has given due consideration to the Rochdale Envelope in the screening process for LSE. The worst-case (i.e. the potentially most impactful) construction, operational and decommissioning scenarios identified within the relevant EIA chapters (**ES Volume I Chapters 8-20, Application Document Ref. 6.2**) have been assessed in relation to impact pathways.

4.5. Interaction with Other Competent Authorities

4.5.1. PINS (2024) requires an evaluation of the potential for the Proposed Development to require other consents which could also require HRA by different competent authorities, and a statement as to whether -significant effects are likely in respect of European Sites in devolved administrations or within EEA States.

4.5.2. The relevant competent authority in this instance is the Secretary of State as Examining Authority.

4.5.3. It is confirmed that the Order Limits for the Proposed Development does not overlap with areas of devolved administrations, nor with those of other European States. Given this, significant effects are not likely to occur as the Site is too distant from any devolved administration or European State (the closest being Wales, over 150km to the west of the Site) and there would be no impacts on qualifying species or habitats of European Sites located outside England.

4.6. Consultation with Natural England and/ or General Public

4.6.1. Regulation 63(3) and (4) of the Habitats Regulations refer to the need for, and option of, consultation with Natural England (as the Appropriate Nature Conservation Body) and the public respectively.

4.6.2. Natural England was consulted at both EIA Scoping stage and statutory consultation on the Preliminary Environmental Information (PEI) Report on the proposed scope of the ecological impact assessment (EclA) and the preliminary findings of the EclA. A summary of the comments received from Natural England in respect of the potential for adverse effects on European Sites is provided in **Table 11.2** of **ES Volume I Chapter 11: Biodiversity and Nature Conservation (Application Document Ref. 6.2)**.

4.6.3. Engagement with Natural England continued up to submission of the Application, to provide copies of final draft documents and to have a pre-application meeting to:

- discuss final proposals and assessments;
- obtain feedback prior to submission of Application; and

- agree an approach to drafting of Statements of Common Ground (SoCG) prior to submission of the Application.

- 4.6.4. Natural England’s response to the pre-application consultation was received on the 25th July 2025 and the advice received has been considered in this Appropriate Assessment Report.
- 4.6.5. The above consultations with Natural England fulfil the PINS requirement (PINS, 2024) for pre-submission discussions with Natural England.
- 4.6.6. Other consultees, including the Environment Agency, North Lincolnshire Council and Lincolnshire Wildlife Trust were also ~~consulting~~consulted at EIA Scoping stage and either offered advice on the scope of the HRA or made no specific comment on HRA in their responses to statutory consultation (refer to **ES Volume II Appendix 1B (Application Document Ref. 6.3)**).
- 4.6.7. The public have been able to take part and provide their views of the Proposed Development through the Applicant's pre-application statutory consultation process which took place in January-February 2025. Information on responses is set out in the Consultation Report (**Application Document Ref. 5.1**).

5. Baseline Evidence Gathering

5.1. Scope

- 5.1.1. There is no guidance that dictates the scope of an HRA in all circumstances, although specific guidance does exist for particular pathways of impact. Therefore, in considering the scope of the assessment, guidance was primarily provided by the identified impact pathways (called the 'source-pathway-receptor model').
- 5.1.2. Briefly defined, impact pathways are routes by which the implementation of a project can lead to an effect upon a European Site. An example of this would be visual and noise disturbance arising from the construction work or operational phase of a project. If there are sensitive ecological receptors within a nearby European Site (e.g. non-breeding overwintering birds), this could alter their foraging and roosting behaviour and potentially affect the integrity of the European Site. For some impact pathways (notably atmospheric pollution) there is guidance that sets out distance-based zones required for assessment. For others, a professional judgment must be made based on the best available evidence.

5.2. Relevant European Sites

- 5.2.1. Guidance published by the Environment Agency and Defra (Environment Agency and Defra, [20252025a](#)) recommends that for large power generation developments greater than 50MW, a radius of search of 15km should be used when identifying relevant European Sites which may be affected by operational emissions to air. This is the approach in **ES Volume I Chapter 8: Air Quality (Application Document Ref. 6.2.0)**.
- 5.2.2. The following European Sites were identified within a 15km radius of the Proposed Development and require consideration in this document:
- Humber Estuary Special Area of Conservation (SAC), which overlaps with the Site, and at its closest point is 1.3km east of the Main Site;
 - Humber Estuary Special Protection Area (SPA), which is located 9.8km north-east of the closest proposed construction activities and 9.8km north-east of the Main Site;
 - Humber Estuary Ramsar site, which is located as per the Humber Estuary SAC;
 - Thorne Moor SAC, which is located 5.5km north-west of the closest proposed construction activities (use of the access road off the A18) and 6.3km north-west of the Main Site;

- Hatfield Moor SAC, which is located 8.2km south-west of the closest proposed construction activities (replacement of Mabey Bridge) and 10.4km south-west of the Main Site; and
- Thorne and Hatfield Moors SPA, which at its closest point (Thorne Moor) is located 5.5km north-west of the closest proposed construction activities (use of the access road off the A18) and 6.3km north-west of the Main Site.

- 5.2.3. These are the European Sites covered by the air quality impact assessment and discussed in Sections 6 to 8 of this report. Although Ramsar sites are not part of the formal network of European Sites, paragraph 176 of the National Planning Policy Framework (NPPF) Ministry of Housing, Communities and Local Government, Ministry of Housing, Communities & Local Government (2018 to 2021) and Department for Levelling Up, Housing and Communities, 2024) in England extends Ramsar sites the same level of protection as European Sites.
- 5.2.4. In addition to air quality, there are several other impact pathways such as construction and operational disturbance and water quality impacts that could arise from the Proposed Development. All relevant pathways are considered in this assessment.
- 5.2.5. Given the design and location of the Proposed Development, there are no likely impact pathways on European Sites located at greater than 15km from the Proposed Development. Therefore, the search radius applied to identify European Sites of relevance to the air quality impact assessment is considered worst-case and sufficiently precautionary for the requirements of the wider HRA of the Proposed Development.
- 5.2.6. The European Sites of relevance to this document, as named above, were agreed with the Appropriate Nature Conservation Body (Natural England) through via the formal Scoping Opinion (**ES Volume II Appendix 1B (Application Document Ref 6.3)**).
- 5.2.7. An introduction to and a summary of the qualifying features, conservation objectives and threats/ pressures to the site integrity of the relevant European Sites, is provided in the following section. A summary table is also provided as **Appendix A**. The location of these sites in relation to the Proposed Development is illustrated in **Figure 2**.

5.3. Humber Estuary SAC, SPA and Ramsar Site

- 5.3.1. The following text is drawn from the formal citations, data sheets and conservation objectives published for the above designations. This source

information is provided in this HRA Appropriate Assessment Report as follows:

- Appendix B provides the citations and data sheets; and
- Appendix C provides the conservation objectives.

Introduction

- 5.3.2. The Humber Estuary SAC/ Ramsar Site, the boundaries of which are almost contiguous, is a 36,657.15ha estuarine and coastal site located on the eastern coast of England. The boundaries of these sites overlap with the Site at the River Trent at Keadby. The Humber Estuary SPA has a boundary that diverges more markedly from the above sites. As the boundary of the SPA excludes the River Trent it is not closely associated with the Proposed Development. The SPA applies to 37,630.24ha of estuarine and coastal habitat. The Humber Estuary is a large estuary with a high tidal range (macro-tidal). The high suspended sediment loads in the estuary feed a dynamic and rapidly changing system of accreting and eroding intertidal and sub-tidal mudflats and sandflats as well as saltmarsh and reedbeds. Other notable habitats include a range of sand dune types in the outer estuary, together with sub-tidal sandbanks and coastal lagoons. A number of developing managed realignment sites on the estuary also contribute to the wide variety of estuarine and wetland habitats. The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion. As salinity declines upstream, tidal reedbeds and brackish saltmarsh communities fringe the estuary.
- 5.3.3. Significant fish species include river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) which migrate through the estuary to breed in the upper reaches of the rivers of the Humber catchment. Grey seals (*Halichoerus grypus*) are species of the marine environment and come ashore in autumn to form large breeding colonies on the sandy shores of the south bank around Donna Nook, near Grimsby on the North Sea coastline. Natterjack toad (*Epidalea calamita*) is also relevant in the context of the Ramsar site and is present only on the North Sea coast between Saltfleetby-Theddlethorpe at the southern extremity of the Ramsar site.
- 5.3.4. The estuary is used by many species of wintering and passage waterbirds attracted by the different habitats of the SPA. For example, the sandy sediments of the outer estuary typically attract knot (*Calidris canutus*) and grey plover (*Pluvialis squatarola*), while waterfowl prefer the wetland zones of the upper estuary. At high tide, large mixed flocks congregate in key roost sites which are at a premium due to the combined effects of extensive land claim, coastal squeeze and lack of grazing marsh and grassland on both banks of the estuary. In summer, the SPA site supports important breeding populations of bittern (*Botaurus stellaris*), marsh harrier

(*Circus aeruginosus*), avocet (*Recurvirostra avosetta*) and little tern (*Sternula albifrons*).

SAC Qualifying Features

5.3.5. The site qualifies as a SAC under Article 4.4 of the Habitats Directive (Council Directive 92/43/EEC) (European Commission, 1992) by supporting the following Annex I habitats and Annex II species, as per the conservation objectives for the SAC updated in November 2018:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);
- coastal lagoons;
- dunes with *Hippophae rhamnoides*;
- embryonic shifting dunes;
- estuaries;
- fixed coastal dunes with herbaceous vegetation ("grey dunes");
- mudflats and sandflats not covered by seawater at low tide;
- *Salicornia* and other annuals colonizing mud and sand³;
- sandbanks which are slightly covered by sea water all the time;
- shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes");
- sea lamprey;
- river lamprey; and
- grey seal.

SPA Qualifying Features

5.3.6. The site qualifies as a SPA under Article 4.1 of the Birds Directive (as amended) (79/409/EEC) (European Commission, 2009) by supporting populations of the following features, as per the conservation objectives for the SPA updated in February 2019:

- *Botaurus stellaris*; Great bittern (Non-breeding);
- *Botaurus stellaris*; Great bittern (Breeding);
- *Tadorna tadorna*; Common shelduck (Non-breeding);
- *Circus aeruginosus*; Eurasian marsh harrier (Breeding);
- *Circus cyaneus*; Hen harrier (Non-breeding);
- *Recurvirostra avosetta*; Pied avocet (Non-breeding);

³ Mapping showing the location of this pioneer saltmarsh habitat (JNCC, 2025) can be found at <https://environment.data.gov.uk/explore/6da82900-d465-11e4-8cc3-f0def148f590?download=true>. The relevant community is coloured red and is located around the main estuary.

- *Recurvirostra avosetta*; Pied avocet (Breeding);
- *Pluvialis apricaria*; European golden plover (Non-breeding);
- *Calidris canutus*; Red knot (Non-breeding);
- *Calidris alpina alpina*; Dunlin (Non-breeding);
- *Philomachus pugnax*; Ruff (Non-breeding);
- *Limosa limosa islandica*; Black-tailed godwit (Non-breeding);
- *Limosa lapponica*; Bar-tailed godwit (Non-breeding);
- *Tringa totanus*; Common redshank (Non-breeding);
- *Sterna albifrons*; Little tern (Breeding); and
- non-breeding waterbird assemblage⁴.

Ramsar Qualifying Features

5.3.7. The site qualifies as a Ramsar for the following Ramsar criteria:

- Criterion 1 - The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/ saline lagoons;
- Criterion 3 - The Humber Estuary Ramsar site supports a breeding colony of grey seals at Donna Nook, the second largest grey seal colony in England. The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site are the most north-easterly breeding site in Great Britain of the natterjack toad;
- Criterion 5 – The site supports an assemblage of international importance. This is an assemblage of 153,934 waterfowl during the non-breeding season (5-year peak mean 1996/97-2000/2001);
- Criterion 6 – The site species/ populations occur at levels of international importance. These being:
 - common shelduck, 4,464 individuals, wintering, representing an average of 1.5% of the Great Britain wintering population (5-year peak mean 1996/7-2000/1);
 - Eurasian golden plover, 30,709 individuals, wintering, representing an average of 3.3% of the population (5-year peak mean 1996/7-2000/1);

⁴ Following the standard Wetland Bird Survey (WeBS) definition this is considered to encompass other species of wildfowl (ducks, geese and swans), waders, rails, divers, grebes, cormorants and heron.

- red knot, 28,165 individuals, wintering, representing an average of 6.3% of the population (5-year peak mean 1996/7-2000/1);
 - dunlin, 22,222 individuals, wintering, representing an average of 1.7% of the population (5-year peak mean 1996/7-2000/1);
 - black-tailed godwit, 1,113 individuals, wintering, representing an average of 3.2% of the population (5-year peak mean 1996/7-2000/1);
 - bar-tailed godwit, 2,752 individuals, wintering, representing an average of 2.3% of the population (5-year peak mean 1996/7-2000/1); and
 - common redshank, 4,632 individuals, wintering, representing an average of 3.6% of the population (5-year peak mean 1996/7-2000/1).
- Criterion 8 - The Humber Estuary acts as an important migration route for both river lamprey and sea lamprey between coastal waters and their spawning areas.

5.3.8. Natterjack toad is not relevant to this HRA [Screening Appropriate Assessment Report](#) given the restriction of the population to the Saltfleetby-Theddlethorpe coastal sand dune system which is located more than 60km from the Site. This population is located well beyond the worst-case potential zone of influence of the Proposed Development.

[Conservation Objectives](#)

5.3.9. Regarding the Humber Estuary SAC natural habitats and/ or species for which the site has been designated (the 'Qualifying Features') and subject to natural change, the conservation objectives are to:

“ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

the extent and distribution of qualifying natural habitats and habitats of qualifying species;

the structure and function (including typical species) of qualifying natural habitats;

the structure and function of the habitats of qualifying species;

the supporting processes on which qualifying natural habitats and habitats of qualifying species rely;

the populations of qualifying species; and

the distribution of qualifying species within the site.”

5.3.10. Regarding the Humber Estuary SPA and the individual species and/ or assemblage of species for which the site has been classified (the ‘Qualifying Features’), and subject to natural change, the conservation objectives are to:

“ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

the extent and distribution of the habitats of the qualifying features;

the structure and function of the habitats of the qualifying features;

the supporting processes on which the habitats of the qualifying features rely;

the population of each of the qualifying features; and

the distribution of the qualifying features within the site.”

Threats/ Pressures to Site Integrity

5.3.11. The following threats/ pressures (**Table 1**) to the site integrity of the Humber Estuary SAC and SPA were identified by Natural England in the Scoping Opinion.

5.3.12. The Site Improvement Plan has also been reviewed (Natural England, 2015) and no additional potential threats/ pressures were identified that could arise from the Proposed Development.

Table 1 - Threats/ Pressures Identified by Natural England in Relation to the Humber SAC and SPA and the Relevance of these to the Proposed Development

Pressure/threat	Qualifying feature	Potential for impact	Relevant phase of the Proposed Development
Loss or damage of habitats due to the Site overlapping the SAC/Ramsar site	Habitats	No	No construction works are proposed within the River Trent that would remove or damage qualifying habitats. The Site only overlaps with the River Trent to encompass the existing operational cooling water outfall structure for Keadby 1 Power Station (which also receives treated effluent from Keadby 2 Power Station), and the offloading

Pressure/threat	Qualifying feature	Potential for impact	Relevant phase of the Proposed Development
			<p>of materials at the existing port facility.</p> <p>The operational outflow of treated effluent via the Keadby 1 Power Station cooling water discharge pipeline is not likely to cause scour or erosion of habitats given the small volume which will remain within the parameters of the existing combined discharge from the Keadby 1 and Keadby 2 Power Stations as regulated by the Environment Agency under Environmental Permit EPR/YP3133LL/V013, originally issued in April 2006. This allows a maximum flow rate of water/effluent to the River Trent of 15m³/sec.</p> <p>It is anticipated that the rate of discharge from the Proposed Development will be less than 1m³/sec and be discharged intermittently, in combination with the 0.1m³ /sec discharged from Keadby 2 Power Station. Consequently, it is considered that the Proposed Development will be operating well within the established consented parameters set for the Keadby Power Station Site. If Keadby 1 is subsequently decommissioned then the flow rate would be substantially reduced relative to the current baseline.</p>

Pressure/threat	Qualifying feature	Potential for impact	Relevant phase of the Proposed Development
Noise and visual disturbance - potential impacts that may arise from the proposal relate to the presence of mobile SPA interest features both within and outside of the site boundary.	Birds	Yes	Could occur during construction, operation and/or decommissioning.
Temporary or permanent impacts on foraging resources for qualifying species features	Birds, lamprey	Yes	Could occur during construction, operation. Not likely during decommissioning given this would involve only dismantling and deconstruction of above ground structures, and the cessation of cooling water abstraction and treated effluent discharge.
Atmospheric pollution	Habitats, birds, lamprey	Yes	Could occur during construction, operation and/or decommissioning. The Humber Estuary SPA in isolation could only be affected during operation. It is too distant to require a construction and decommissioning air quality impact assessment, as this is only required for sites within 200m of the affected road network.
Water pollution	Habitats, birds, lamprey	Yes	Could occur construction, operation and/or decommissioning.
Fish mortality, entrapment and barriers to movement	Lamprey	Yes	Could occur construction, operation and/or decommissioning.

5.4. Thorne Moor SAC, Hatfield Moor SAC and Thorne and Hatfield Moors SPA

5.4.1. The following text is drawn from the formal citations, data sheets and conservation objectives published for the above designations. This source information is provided in this HRA Appropriate Assessment Report as follows:

- Appendix B provides the citations and data sheets; and
- Appendix C provides the conservation objectives.

Introduction

5.4.2. The Thorne Moor and Hatfield Moors SAC, which both contain habitats designated as Thorne and Hatfield Moors SPA, together comprise 30,280.91ha of degraded raised bog with associated standing water, fen, heathland and woodland habitats and are located in South Yorkshire between Doncaster and Scunthorpe. The boundaries of these sites do not overlap with the Site, and instead at the closest point are located 5.5km from the Site.

SAC Qualifying Features

5.4.3. Thorne Moor and Hatfield Moor both qualify as SAC under Article 4.4 of the Habitats Directive (Council Directive 92/43/EEC) (European Commission, 1992) as they both support 'degraded raised bogs still capable of natural regeneration' Annex I habitat, as per the conservation objectives set for each of the SAC.

SPA Qualifying Features

5.4.4. The Thorne and Hatfield Moors SPA qualifies under Article 4.1 of the Birds Directive (as amended) (79/409/EEC) (European Commission, 2009) by supporting populations of European nightjar (*Caprimulgus europaeus*) (Breeding), as per the conservation objectives for the SPA.

Conservation Objectives

5.4.5. With regard to natural habitats and/ or species for which both the Thorne Moor SAC and the Hatfield Moor SAC have been designated (the 'Qualifying Features'), and subject to natural change, the conservation objectives are identical between the two sites and are to:

“ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

the extent and distribution of qualifying natural habitats;
the structure and function (including typical species) of qualifying natural habitats;
and
the supporting processes on which qualifying natural habitats rely.”

5.4.6. Regarding the Thorne and Hatfield Moors SPA, individual species and/ or assemblage of species for which the site has been classified (the ‘Qualifying Features’), and subject to natural change, the conservation objectives are to:

“ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
the extent and distribution of the habitats of the qualifying features;
the structure and function of the habitats of the qualifying features;
the supporting processes on which the habitats of the qualifying features rely the population of each of the qualifying features; and
the distribution of the qualifying features within the site.”

Threats/ Pressures to Site Integrity

5.4.7. The following threats/ pressures (**Table 2**) to the site integrity of the Humber Estuary SAC and SPA were identified by Natural England in the Scoping Opinion.

5.4.8. The Site Improvement Plan has also been reviewed (Natural England, 2015) and no additional potential threats/ pressures were identified that could arise from the Proposed Development.

Table 2 - Threats/ Pressures Identified by Natural England in Relation to the Thorne and Hatfield Moors Designations and the Relevance of these to the Proposed Development

Pressure/threat	Qualifying feature	Potential for impact	Relevant phase of the Proposed Development
Atmospheric pollution	Habitats	Yes	Could occur during operation. Too distant to require assessment in relation to construction and

Pressure/threat	Qualifying feature	Potential for impact	Relevant phase of the Proposed Development
			decommissioning given this is restricted to a 200m study area around the affected road network.

6. Test of Likely Significant Effects

6.1. Overview

- 6.1.1. This section examines the LSE of the Proposed Development. It is structured by development phase, first by the construction period and then by the operation and decommissioning periods.
- 6.1.2. Given the timeline for future decommissioning, which would not take place for at least 25 years following commencement of operations, the parameters for assessment of this are less certain. Given this, the construction phase is considered a reasonable and suitably precautionary proxy for potential impacts during decommissioning. This is because requirements at decommissioning (dismantling and deconstruction of buildings and structures installed at construction) will be comparable to or of lesser scale and magnitude than those at construction. It is also assumed that comparable legislation, permitting and regulatory regimes will control the potential impact of decommissioning on the natural environment, in the same way that they do during construction and operation.
- 6.1.3. The European Sites included within this screening assessment, as first identified and described above in Sections 5.3 and 5.4 of this report, are:
- Humber Estuary SAC;
 - Humber Estuary SPA;
 - Humber Estuary Ramsar site;
 - Thorne Moor SAC;
 - Hatfield Moor SAC; and
 - Thorne and Hatfield Moor SPA.
- 6.1.4. The potential pathways for impact on these European Sites are drawn from those summarised and screened in **Tables 1 and 2** of this document.
- 6.1.5. Each of the identified potential impact pathways (e.g. noise and visual disturbance, air quality etc.) is discussed separately for each phase of the Proposed Development to which that impact pathway applies.

6.2. Construction

Habitat Disturbance and Modification - Construction

- 6.2.1. As stated in the project description, the part of the Site encompassing the River Trent reflects the locations of the existing operational cooling water outfall structure that is to be used in its current operational state by the Proposed Development, and also the port facilities required to enable

mooring of vessels during loading/ unloading, where the largest vessels may be required to be moored for the full tide cycle.

- 6.2.2. Therefore, unlike the consented Keadby CCS Power Station, for which the Proposed Development is an alternative, (i.e. only one of the two developments would be implemented), no construction works are proposed within the River Trent, so there would be no direct impacts on the habitats of the Humber Estuary SAC and Ramsar site during construction (the other European Sites named in 6.1.3 are too distant for this pathway to apply). Potential indirect impacts from sediment mobilisation from construction areas are assessed under water pollution (paragraph 6.2.57 onwards).
- 6.2.3. In relation to the loading and unloading of vessels, as happened during deliveries for Keadby 2 Power Station and has also been considered and agreed when granting the Keadby CCS Power Station DCO, vessels could be required to rest during a tide cycle on the bed of the estuary (Crown Land). This usage is consistent with existing permitted port related activity at Keadby. As an active port, a small number of vessels do rest on the bed when moored and the proposed use (and any related disturbance minor impacts) is considered routine and entirely consistent with current practices at the wharf as a commercial port facility. No new construction works are proposed to facilitate use of the existing wharf by vessels.
- 6.2.4. Given the established use of the port facilities, no new habitat impacts are likely to arise as a consequence because of the loading and unloading of vessels for the Proposed Development. So, no LSEs are anticipated. The construction habitat disturbance pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives. Noise, Vibration and Visual Disturbance - Construction
- 6.2.5. The qualifying interest features of relevance to this potential impact pathway are:
- bird species for which the Humber Estuary SPA and Ramsar site are designated; and
 - lamprey species for which the Humber Estuary SAC and Ramsar site are designated.
- 6.2.6. The Natural England Site Improvement Plan for the Humber Estuary SPA highlights that this site and its qualifying bird species are potentially sensitive to public access and disturbance, primarily because of recreational use (Natural England, 2015). So, they are also sensitive to other potential sources of visual and noise disturbance, such as those that would arise during construction. While the Humber Estuary SPA is located more than 9km from the closest potential construction works for the Proposed Development, Natural England has previously advised that it

cannot be discounted that the habitats along the River Trent have value as foraging habitat for qualifying bird species. Therefore, assessment is needed of potential visual and airborne noise disturbance in relation to such habitat usage.

- 6.2.7. Similarly, there is a need to consider visual and airborne noise disturbance on birds in relation to the Humber Estuary Ramsar site, as the boundary coincides with the location of the Proposed Development at the locations of the Waterborne Transport Offloading Area and the existing Keadby 1 Power Station Cooling Water Discharge. All other construction activities will be undertaken in locations at greater distance from the Ramsar site, on land to the west of Keadby village. Most construction activities, and the potentially most intrusive longer-term activities, will be focussed on the location of the Main Site and Ancillary Facilities and are therefore located more than 900m to the west of the Ramsar site.
- 6.2.8. Of the named qualifying bird species listed in Section 5.3, it is wading birds (except for pied avocet) and shelduck that are of potential relevance to the Proposed Development in relation to bird usage of the River Trent. Great bittern can be scoped out given it is dependent on large stands of reedbed that only occur around the main estuary, with the closest habitat located in the Blacktoft Sands area. Marsh and hen harrier both require similar habitats for the purposes of breeding and/ or foraging, again meaning that they are unlikely to have more than an incidental presence along the River Trent, and adjacent land (which is intensively farmed) is also not considered to be of functional importance for these species. Pied avocet is a wader species that breeds in association with saline lagoons, which again is a habitat only present around the main estuary and within Blacktoft Sands at the closest point. Finally, there are no breeding habitats for little tern along the River Trent given this is a strictly coastal species that favours beaches as nesting habitat. Natural England has confirmed (letter dated 27 November 2025) that these bird species can be scoped out due to a lack of suitable habitats in proximity to the Proposed Development.
- 6.2.9. Therefore, the qualifying bird species of potential relevance are non-breeding populations of common shelduck, European golden plover, red knot, dunlin, ruff, black-tailed godwit, bar-tailed godwit, common redshank, and a wider non-breeding waterbird assemblage. The latter encompasses the named waterbird species dependent on mudflat habitats, and other waterbird species that could make use of this habitat. ~~With the exception of~~ Except for mallard, none of the other bird species (black-bellied brent goose and duck species) encompassed under the 'assemblage' criterion are likely to make use of the River Trent given the absence of optimal foraging habitats. Again, these latter species will be focussed at Blacktoft Sands and other habitats around the main estuary. This assessment is supported by the British Trust for Ornithology (BTO) Bird Data Report obtained for the Proposed Development and utilising data for the period

2007 to 2024 (**Appendix D**) which identifies no notable aggregations of qualifying bird species for the 10km grid square within which the Site is located. Previous BTO Wetland Bird Survey (WeBS) low tide counts on the River Trent (Sector Codes CH054 Keadby to Arncotts and CH055 Arncotts to Luddington) have only recorded mallard in numbers exceeding 1% of the Humber Estuary population.

- 6.2.10. Potential visual disturbance at the River Trent would remain comparable with the existing baseline. The river is visually screened from activities within the village and on adjacent land by the existing flood bank. Further, unloading and transportation activities would be consistent with existing activities at the port, on adjacent roads and within the context of the settlement of Keadby. Activities for the Proposed Development would therefore not meaningfully add to the existing long-standing baseline context. Therefore, excluding the legitimate permitted activities associated with the offloaded of materials at Keady Port there are no pathways for visual disturbance of birds using the limited mudflat habitat present along the margins of the channel of the River Trent.
- 6.2.11. The minimum noise threshold for a potential impact on birds from regular construction noise, such as vibro-piling, is 50dB (Cutts *et al.*, 2009). Therefore, only noise levels above 50dB require further consideration and assessment. Previous studies such as Institute of Estuarine and Coastal Studies (1999) and ERM (1996) have demonstrated that qualifying birds occupying habitats elsewhere in the Humber Estuary, such as the Salt End and Pyewipe mudflats, are relatively tolerant of construction activities including piling noise levels (e.g. marine piling to construct new jetties). Based on bird behaviour and noise monitoring studies undertaken by Xodus Group during construction piling for the Grimsby River Terminal (Xodus Group, 2012), the significance criteria for disturbance to birds are summarised below:
- >50 to ≤65dB LA_{max} – negligible;
 - 66 to ≤75dB LA_{max} – minor adverse;
 - 76 to ≤85dB LA_{max} – moderate adverse; and
 - 86dB LA_{max} – major adverse.
- 6.2.12. The above criteria have been applied for other developments within the Humber region e.g. Keadby CCS Power Station and the South Humber Bank Energy Centre HRA Signposting report (EP Waste Management Ltd, 2020). Natural England has considered the above thresholds appropriate when consulted on these prior developments.
- 6.2.13. Construction activities and locations would be comparable with (at the Main Site and Ancillary Facilities), or less than (at the River Trent, given the Proposed Development does not require piling operations for a cofferdam within the River Trent), the noise levels reported and modelled

for the consented Keadby CCS Power Station, the HRA for which concluded no LSE. On that basis there is no reasonable likelihood of the Proposed Development resulting in LSE as it would remain within the parameters assessed and agreed during Examination of the Keadby CCS application. This is explained further below and is supported by **Appendix D** which was prepared to inform a preliminary consultation with Natural England prior to publication of the PEI Report.

- 6.2.14. The worst-case modelled airborne absolute noise level as a result of construction activities for the Main Site (i.e. the main civil engineering works) at NSR 4 (Mariners Arms Flats), a relatively quiet location adjacent to the banks of the River Trent and the Humber Estuary Ramsar site, is 47dB which is predicted to occur during weekday daytime construction hours. The comparable value for NSR 3 (Keadby Village), which is located between the Main Site and the River Trent, is 49dB. Canal water abstraction construction noise is predicted to be 48dB at NSR 3 and NSR 4 during weekday daytime construction hours. These absolute noise levels are all less than the baseline sound levels at NSR 3 and 4 which is 53 and 55dB respectively. This assessment is supported by the noise contour map provided as **Figure 3** which demonstrates that worst-case noise levels at the Humber Estuary Ramsar site would remain below 50dB. Therefore, construction noise at the Main Site and Ancillary Facilities would not be discernible at the River Trent from the existing baseline. It is therefore concluded that construction activities for the Main Site and Ancillary Facilities would not result in noise levels that are likely to be adverse for qualifying bird species of the Humber Estuary SPA and Ramsar site when utilising habitats within these designations. So no LSEs are anticipated for qualifying bird species occupying these European Sites.
- 6.2.15. Noise and visual disturbance as a result of construction works at the Main Site and Ancillary Facilities could also affect qualifying bird species if adjacent areas of agricultural land are of functional importance to these birds for foraging. Similarly, birds that forage over water could be affected if the Stainforth and Keadby Canal is of functional importance. No LSE were identified in relation to Keadby CCS Power Station and the habitat conditions have not changed in the intervening period. This topic has been revisited to respond to stakeholder comments in the Scoping Opinion and pre-Application. As visual disturbance would likely occur at the same time as activities generating noise and would affect a smaller area of land (i.e. within the sight line of the birds concerned), the following assessment focusses on noise as the greater potential disturbance impact.
- 6.2.16. Noise levels could reach farmland of potential value for certain qualifying bird species. The noise modelling (**Figure 3**) undertaken for the Proposed Development indicates that construction and decommissioning could result in noise levels at farmland of more than 50dB so there could be LSEs. So as to allow further review of this pathway consistent with the approach taken for the Keadby CCS Power Station, the noise disturbance

pathway remains **screened in** for Appropriate Assessment in relation to those bird species that might use agricultural land and/or the Stainforth and Keadby Canal.

6.2.17. Moving onto consideration of river and sea lamprey for which the Humber Estuary SAC and Ramsar site are designated. Construction of a cofferdam within the Stainforth and Keadby Canal would result in underwater construction noise and vibration from piling activities and this could potentially have a temporary deterrent effect on the ability of lamprey to access breeding habitats if the canal is used for migration. Natural England previously requested (in relation to Keadby CCS Power Station) that the canal not be discounted as a possible migration corridor for lampreys.

6.2.18. ~~So as to~~To allow further critical review of this pathway consistent with the approach taken for the Keadby CCS Power Station, the noise and visual disturbance pathway remains **screened in** for Appropriate Assessment in relation to the possible use of the Stainforth and Keadby Canal by lampreys.

6.2.19. Natural England has advised that they consider that visual disturbance could adversely impact lamprey migration along the River Trent if lighting is used between dusk and dawn over the period 1st May to 30th November. This pathway is unlikely to operate given the committed construction hours of 07:00 to 19:00 but LSEs from lighting cannot be fully discounted.

6.2.20. To allow further critical review of this pathway, the lighting disturbance pathway remains **screened in** for Appropriate Assessment in relation to the possible use of the River Trent by migrating lampreys.

Invasive Non-Native Species - Construction

~~6.2.19.~~6.2.21. The Preliminary Ecological Appraisal (PEA) of the Proposed Development (**ES Volume II Appendix 11C - Application Document Ref. 6.3**) identified several invasive non-native plant and animal species present within the Stainforth and Keadby Canal. These include zebra mussel (*Dreissena polymorpha*), demon shrimp (*Dikerogammarus haemonbaphes*) and Nuttall's waterweed (*Elodea nuttallii*). These species are already well established, and there are no barriers to the dispersal of these species between the canal and the river. Given this, construction works within the Stainforth and Keadby Canal would not interact with these species in a manner that would pose a new threat to the Humber Estuary SAC and Ramsar site, and the Humber Estuary SPA located further downstream. The pathway for spread already exists, is

uncontrolled, and these species are present where habitats are suitable for establishment.

~~6.2.20~~6.2.22. Given this, there are no INNS that are likely to be transferred to the River Trent ~~as a consequence~~because of construction activities within the Stainforth and Keadby Canal. Further, given the known presence of invasive species, the Applicant is subject to strict legal requirements under the Wildlife and Countryside Act 1981 (as amended) and other legislation that apply irrespective of the proximity to European Sites. Legislative compliance is mandatory and therefore construction would not be undertaken in a manner that is likely to result in offences. It would also be standard practice for general good practice biosecurity measures to be required by the regulator under the terms of an Environmental Permit for works within watercourses (Environment Agency, 2019), and construction activity could not proceed until the Environmental Permit had been received. Consequently, suitable embedded general biosecurity measures to achieve legislative compliance are allowed for within the **Outline CEMP (Application Document Ref. 7.4)** and will be secured via the final CEMP.

~~6.2.21~~6.2.23. In this context, and with the reasonable expectation that permitting regimes will be applied robustly by the regulator, construction works are not likely to introduce INNS and result in LSE at the European Sites or interfere with the ability of these sites to achieve their conservation objectives. The construction INNS pathway is **screened out** from Appropriate Assessment.

Atmospheric Pollution - Construction

~~6.2.22~~6.2.24. Construction activities have potential to impact the Humber Estuary SAC and Ramsar site through:

- dust, which may be generated by:
 - earthworks (soil stripping, spoil movement and stockpiling);
 - construction (including on-site concrete batching); and
 - trackout (HGV movements on unpaved roads and offsite mud on the highway).
- emissions of pollutants to air (oxides of nitrogen (NO_x) and nitrogen deposition, although commentary on sulphur dioxide (SO₂), ammonia and acid deposition is also provided below) because of movements of construction traffic on-site and on the affected road network.

~~6.2.23~~6.2.25. As noted in **Tables 1 and 2**, the Humber Estuary SPA and the Thorne and Hatfield Moors designations are located at too great a distance from the Site to require construction air quality impact assessment. These European Sites do not occur within the zone of influence for a construction air quality impact assessment. Dust deposition

and emissions of pollutants to air from construction works will therefore not result in LSE at the Humber Estuary SPA and the Thorne and Hatfield Moors designations or interfere with the ability of these sites to achieve their conservation objectives. This specific pathway is **screened out** from Appropriate Assessment in relation to the Humber Estuary SPA and the Thorne and Hatfield Moors designations as it would not affect the conservation objectives.

~~6.2.24-6.2.26.~~ To assess this pathway further in relation to the Humber Estuary SAC and Ramsar site and in accordance with typical accepted good practice, as described in **ES Volume II Appendix 8A: Air Quality – Construction Phase (Application Document Ref. 6.3)**, a qualitative assessment has been made of construction dust, and modelling of construction phase road traffic emissions has been undertaken in relation to the Humber Estuary SAC and Ramsar site. The latter modelling was undertaken as detailed in current guidance (Institute of Air Quality Management (IAQM), 2017) and provides a ‘detailed level’ assessment that uses dispersion modelling to predict pollutant concentrations, considering additional variables. The assessment used the Atmospheric Dispersion Modelling System for Roads (ADMS Roads) model (version 5.0.0) to predict road pollutant contributions at identified sensitive receptors. Cumulative impacts from existing sources of pollution in the area are accounted for in the adoption of site-specific background pollutant concentrations from archived and published sources.

~~6.2.25.~~ ~~The study area set within good practice for consideration of potential dust emissions from construction works and/ or from a public road used by construction traffic is 50m from source (IAQA, 2024). This pathway would then only apply if dust was actually mobilised into the wider environment, which is not likely given public health requirements for the control of dust. The closest construction activities for the Proposed Development are for the Canal Water Abstraction which is located over 600m from the Humber Estuary SAC and Ramsar site, and wheel washes and dust suppression would be typically applied before construction vehicles exit construction areas to protect public health. However, for purposes of assessment potential for dust mobilisation, it is considered that dust could be generated from vehicle movements within 50m of the Humber Estuary SAC and Ramsar site.~~

~~6.2.26-6.2.27.~~ It is anticipated that only ~~relatively minor the~~ site clearance works ~~would be~~ required as part of the ~~Preliminary Works~~ preliminary works activities associated with the construction of the Proposed Development ~~are likely to produce dust~~. Such site clearance works are not explicitly contained in the Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction works (IAQM, 2024), and for the purposes of this assessment, the closest assessment

category available in the IAQM 2024 guidance is ~~considered to be~~ 'Demolition'.

~~6.2.27. Dust could affect qualifying habitat features of the Humber Estuary SAC and Ramsar site through mechanisms such as smothering and direct toxicity (although the latter is not likely given legal requirements and public health considerations). There are no species features for which construction dust would be a relevant consideration.~~

~~6.2.28. The qualifying habitat features within the zone of influence relevant to the assessment of dust are (all other qualifying habitats being located around the margins of the main Humber Estuary):~~

- ~~• estuaries — encompassing the main river channel; and~~
- ~~• mudflats and sandflats not covered by seawater at low tide — encompassing the marginal mud banks exposed at low tide.~~

~~6.2.29. During the examination of the Keadby CCS Power Station DCO, Natural England initially advised that this species-poor riparian vegetation on the banks of the River Trent should be considered saltmarsh in the context of the Humber Estuary SAC and Ramsar site. The study area set within good practice for consideration of potential dust emissions from construction works and/ or from a public road used by construction traffic is 50m from source (IAQA, 2024). However, following further review and discussion, it was agreed that this vegetation is not of a type listed as a qualifying interest feature of these sites, as set out in Section 5.3.~~

~~6.2.30. The only type of saltmarsh vegetation identified as a qualifying feature is the 'Salicornia and other annuals colonising mud and sand' vegetation. This is a pioneer saltmarsh vegetation that colonises intertidal mud and sandflats in areas protected from strong wave action and is an important precursor to the development of more stable saltmarsh vegetation. It develops at the lower reaches of saltmarshes where the vegetation is frequently flooded by the tide, and can also colonise open creek sides, depressions or pans within saltmarshes, as well as disturbed areas of upper saltmarshes (JNCC, 2025). There is no niche for such vegetation on the River Trent at Keadby, where there is only a narrow band of intertidal mud that is fully covered by all tides and a sharp transition from this to dense perennial vegetation of common reed. Online mapping⁵ confirms that the Salicornia community is restricted, as would be expected given its~~

⁵ Mapping showing the location of this saltmarsh habitat can be found <https://environment.data.gov.uk/explore/6da82900-d465-11e4-8cc3-f0def148f590?download=true> — the relevant community is coloured red and is located around the main estuary

~~habitat requirements, to the main Humber Estuary, more than 9km away, and it does not coincide with the River Trent. So dust deposition onto saltmarsh would not occur during construction.~~

~~6.2.28. The estuary and mudflat habitats are either permanently submerged, or periodically exposed and re-submerged as part of the normal tidal cycle. Any **ES Volume II Appendix 8A** indicates that dust could be received at the habitats of the Humber Estuary SAC and Ramsar site.~~

~~6.2.31. The potential construction dust deposited in these circumstances would add trivial amounts to the existing high sediment load already carried by the estuary.~~

~~6.2.32-6.2.29. In this context, dust deposition from construction works will not result in LSE at the Humber Estuary SAC and Ramsar site or interfere with the ability of these sites to achieve their conservation objectives. This specific pollution pathway is remains **screened out from in** for **Appropriate Assessment** as it would not affect the conservation objectives in relation to the habitats of the Humber Estuary SAC and Ramsar site.~~

~~6.2.33-6.2.30. For the construction traffic assessment, all potentially affected roads (roads that experience a change in traffic flow above a certain criteria) have been assessed at a 'detailed level' of assessment. As detailed in IAQM and Environmental Protection UK (EPUK) Land-use Planning & Development Control: Planning for Air Quality Guidance (IAQM, 2017), a 'detailed level' assessment uses dispersion modelling to predict pollutant concentrations, considering additional variables. The detailed assessment of local air quality has used the Cambridge Environmental Research Consultants (CERC) Atmospheric Dispersion Modelling System (ADMS) Roads dispersion model (version 5.0.0) to predict road pollutant contributions at identified sensitive receptors. There is only a requirement to consider road traffic emissions in relation to Humber Estuary SAC and Ramsar site in relation to those areas that are within 200m of affected roads.~~

~~6.2.34-6.2.31. Predictions in traffic flows have been made for the baseline year (2024) and the peak construction year (2036, due to uncertainty in the timing of the construction schedule, as this represents a 'worst-case' traffic scenario (see **ES Volume I Chapter 10: Traffic and Transportation (Application Document Ref. 6.2)**). Air quality is expected to improve as traffic emissions and emissions from other sources progressively decrease across the UK, and an earlier year would therefore provide a more conservative assessment of potential air quality effects.~~

~~6.2.32. It is emphasised that the traffic air quality assessment was undertaken in combination from the outset. The construction results presented in~~

Appendix E, as relied on below, are therefore the in-combination results for the Proposed Development with the baseline.

6.2.35-6.2.33. The atmospheric dispersion modelling and predicted impacts on European Sites reported in **ES Volume II Appendix 8A (Application Document Ref. 6.3)** has considered the traffic data (Annual Average Daily Traffic (AADT)) reported in **ES Volume I Chapter 10: Traffic and Transportation (Application Document Ref. 6.2)**. At the time of submission of the PEI Report it was anticipated that there would be in the order of 1,022 two-way vehicle movements per day during the peak construction period and this informed the atmospheric dispersion modelling. Updated traffic data was provided for the ES and the AADT associated with the ES are slightly lower than those modelled for the PEI Report. Based on the reduction in AADT between the PEI Report and the ES, it was considered that no additional modelling was required given that the impacts were ~~considered to be~~ negligible for the PEI Report and therefore the overall outcome of the assessment would not change. As such this HRA Appropriate Assessment Report relies on the modelling undertaken at PEI Report stage which represents the worst-case scenario.

6.2.36-6.2.34. Traffic movements will be controlled during the Proposed Development construction phase ~~in order~~ to minimise potential impacts on the surrounding road network, namely construction HGV arriving or departing the Site would travel to/ from the west via the A18, A161 and onwards to the M180 Junction 2. Therefore, most vehicle movements will be more than 500m from the European Sites and consequently beyond the potential zone of influence for a potential atmospheric pollution impact on the relevant designations. This substantively limits the pollution for an atmospheric pollution impact during construction.

6.2.37-6.2.35. The potential zone of influence of construction traffic movements, as defined and used in **ES Volume II Appendix 8A: Air Quality - Construction Phase (Application Document Ref. 6.3)**, is 200m from road links in the study area. According to Highways England (2019), beyond 200m the contribution of vehicle emissions from the roadside to local pollution levels can be considered insignificant. The only European Sites in the zone of influence of construction traffic movements are the Humber Estuary SAC and Ramsar site, and the relevant habitats are again estuaries and mudflats. The Humber Estuary SPA may also be relevant where certain qualifying bird species also make use of (are functionally dependent on) habitats present in the SAC and Ramsar site.

6.2.36. The qualifying habitat features within the zone of influence relevant to the assessment of traffic are (all other qualifying habitats being located further away):

- estuaries – encompassing the main river channel;

- mudflats and sandflats not covered by seawater at low tide – encompassing the marginal mud banks exposed at low tide;
- upper saltmarsh; and
- common reed vegetation fringing the River Trent.

6.2.37. During the examination of the Keadby CCS Power Station DCO, Natural England initially advised that this species-poor riparian vegetation of common reed (*Phragmites australis*) on the banks of the River Trent should be considered saltmarsh in the context of the Humber Estuary SAC and Ramsar site. However, following further review and discussion, it was agreed that this vegetation is not of a type listed as a qualifying interest feature of these sites, as set out in Section 5.3. However, during more recent consultations on the Proposed Development it was advised that the fringing common reed vegetation still needed to be considered part of the estuary habitat.

6.2.38. There is one other saltmarsh habitat for which the Humber Estuary is designated. This is the ‘*Salicornia* and other annuals colonising mud and sand’ vegetation, but it can be discounted as a relevant saltmarsh habitat for the purposes of the construction assessment. This is a pioneer saltmarsh vegetation that colonises intertidal mud and sandflats in areas protected from strong wave action and is an important precursor to the development of more stable saltmarsh vegetation. It develops at the lower reaches of saltmarshes where the vegetation is frequently flooded by the tide, and can also colonise open creek sides, depressions or pans within saltmarshes, as well as disturbed areas of upper saltmarshes (JNCC, 2025). There is no niche for such vegetation on the River Trent at Keadby, where there is only a narrow band of intertidal mud that is fully covered by all tides and a sharp transition from this to dense perennial vegetation of common reed. Online mapping⁶ produced by the Environment Agency (Environment Agency, 2022) confirms that the *Salicornia* community is restricted, as would be expected given its habitat requirements, to the main Humber Estuary, more than 9km away, and it does not coincide with the River Trent.

6.2.38-6.2.39. Chartered Institute of Ecology and Environmental Management (CIEEM) (2023) states that in the UK, the approach to assessing impacts, particularly at the screening stage of HRA, concentrates on the change in levels arising from a proposed plan or project (either alone or in combination) irrespective of whether critical loads or levels are currently

⁶ Mapping showing the location of this saltmarsh habitat can be found <https://environment.data.gov.uk/explore/6da82900-d465-11e4-8cc3-f0def148f590?download=true> – the relevant community is coloured red and is located around the main estuary

being exceeded at a site. For example, Natural England guidance (2018) states that a project that will result in an increase of no more than 1% of critical loads or levels (either alone or in combination) can be regarded as insignificant in terms of air quality assessment. It is argued that such an approach can be supported by Advocate General Sharpston's Opinion in Case C-258/11 (Peter Sweetman and Others v An Bord Pleanála, 11 April 2013) where at paragraph 48 it is stated:

“the requirement that an effect in question be ‘significant’ exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on the site are thereby excluded. If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill” (European Court of Justice, 2013).

6.2.40. In relation to the above statement, it is noted that Section 8 of this HRA Appropriate Assessment Report identifies, after consideration of ES Chapter 21 Cumulative and Combined Effects (Application Document Ref. 6.2), no third-party plans or projects (other than Keadby 2 which is considered within the modified baseline) that could result in in-combination air pollution effects.

6.2.39-6.2.41. The incomplete combustion of fuel in vehicle engines results in the presence of potential pollutants (combustion products), of which the main pollutants of concern for European Sites are SO₂, NO_x, ammonia and nitrogen and acid deposition. However, the construction air quality impact assessment covered all potential pollutants for which assessment is required. The Air Pollution Information System (APIS) forms the major source of information regarding the air quality impact pathway for these pollutants.

6.2.40-6.2.42. The construction phase may also result in emissions of these pollutants from other sources, such as the use of diesel plant. Due to the phased nature of the construction or decommissioning works, site plant and Non-Road Mechanized Machinery (NRMM) will only be required to be operational at that nearest location for a limited duration over the overall construction period, and only operational on an 'as and when required' basis during that particular phase. Further, there are no construction activities requiring plant and NRMM within the 200m screening distance so there is no requirement to consider non-road machinery and plant. The closest construction activity to the European Sites is for the Proposed Canal Water Abstraction and this is located 600m west of the River Trent.

6.2.41-6.2.43. Although SO₂ is of theoretical relevance, detailed consideration of the associated impacts on local air quality is not considered necessary in relation to the construction traffic movements for the Proposed

Development. It was therefore screened out in within **ES Volume II Appendix 8A: Air Quality - Construction Phase (Application Document Ref. 6.3)** in accordance with current good practice guidance (Highways England, 2019; IAQM, 2017) and APIS which advises that “*the concentrations of SO₂ in the UK are well below the critical level*”. Strict legal limits are placed on the sulphur content of liquid fuels used by road vehicles and ~~as a consequence therefore~~ the contribution of modern road vehicles to sulphur emissions is negligible. ~~As a consequence~~ Consequently, the released concentration is concluded within **ES Volume II Appendix 8A: Air Quality - Construction Phase (Application Document Ref. 6.3)** to be so small that impacts on air quality objectives or critical levels would be insignificant. Therefore, it would not result in LSE.

~~6.2.42-6.2.44.~~ 6.2.44. NOx can be toxic at very high concentrations (at levels far above the annual average critical level). But counter to this, APIS identifies that direct toxic effects are only likely to arise in the presence of equivalent concentrations of sulphur dioxide (SO₂) which, as stated above, would not occur. However, and therefore of greater relevance, high levels of NOx alone or in combination with ammonia can also increase the total nitrogen deposition to soils, potentially leading to deleterious knock-on effects in resident ecosystems. For example, an increase in the total nitrogen deposition from the atmosphere is widely known to enhance soil fertility and to lead to eutrophication. This often has adverse effects on the community composition and quality of semi-natural, nitrogen-limited terrestrial and aquatic habitats (Wolseley *et al*, 2006; Dijk, 2011). The total nitrogen deposition resulting from a plan or project is therefore often assessed as the overarching parameter of relevance for determining the impact of atmospheric pollution from traffic sources. Indeed, current air quality guidance issued by Highways England (2019) focusses solely on nitrogen deposition in relation to ecological features.

~~6.2.43-6.2.45.~~ 6.2.45. APIS specifies a critical NOx concentration (critical level) for the protection of vegetation of 30µgm⁻³. The maximum dose from the Proposed Development received at the Humber Estuary SAC and Ramsar site from construction traffic is 0.1µgm⁻³ (**Appendix E**), which represents 0.3% of the critical level and is therefore well below the critical level threshold for insignificance of 1% of the critical level. Consequently, there are no LSEs from NOx as a potential toxin.

~~6.2.46.~~ 6.2.46. Ammonia from traffic movements can also be a pollutant ~~in its own right as it is toxic to vegetation. However, for a toxic effect to be realised vegetation would need to be present within the 200m study area. But, as stated above, the qualifying habitats within the zone of influence are unvegetated mudflats. Regardless, thereas it is toxic to terrestrial vegetation. The alkalinity of ammonia adversely affects plant biochemistry. Higher plants are less sensitive and, for this reason, the annual critical level for higher plants is 3 µg/m³ but this is reduced to 1 µg/m³ where~~

lower plants (lichens and bryophytes) are a particular interest feature of a habitat. None of the qualifying habitats have lichens and bryophytes as a particular interest feature⁷, so the upper critical level has been used as this is most appropriate. This has been determined by reviewing the relevant swamp and saltmarsh qualifying vegetation communities identified by Natural England for the designation⁸ against the published descriptions of these communities (Rodwell, 1995 & 2000). Within the relevant communities, bryophytes are generally sparse and comprise widespread, unthreatened species that are only incidentally present. Therefore, they are not a particular feature of the qualifying vegetation communities or important for ecosystem integrity. Lichens are not identified as components of these communities and would not typically be anticipated within saltmarsh and swamp habitats.

6.2.44-6.2.47. There are no LSEs in relation to ammonia as the air quality impact assessment (**ES Volume II Appendix 8A: Air Quality – Construction Phase (Application Document Ref. 6.3)**) concludes a maximum dose of ammonia of ~~0.04µgm~~01µg/m⁻³ (**Appendix E**) at the Humber Estuary SAC and Ramsar site. This represents 0.5% of the critical level and is therefore well below the critical level threshold for insignificance of 1% of the critical level.

6.2.45-6.2.48. The APIS website also has a Site Relevant Critical Load Function tool which enables the sensitivity of each interest feature of each European Site to be examined in relation to deposition of nutrient nitrogen (from NOx and ammonia combined). There is no specified critical load for the mudflat habitats within the zone of influence of construction traffic as they would not reasonably have one. All the studies into critical loads are based on rooted macrophytes, so there isn't anything applicable to entirely unvegetated habitats as there is no vegetation to be affected.

6.2.46-6.2.49. Given this, whilstWhilst the qualifying pioneer saltmarsh is considered absent from the zone of influence, ES Volume II Appendix 8A: Air Quality – Construction Phase (Application Document Ref. 6.3))

⁷ Bryophytes and lichens, as with higher plants, encompass a broad range of species of differing status (common to rare, threatened or unthreatened), ecological requirements (generalists versus specialists) and tolerances. Almost all habitats have potential to support common species of bryophytes and lichens, but this does not make it is necessary to apply the lower critical level where they do not have specific relevance to the habitat/community being assessed. APIS makes clear that the lower critical level for ammonia of 1µg NH₃ m⁻³ is only intended to be applied when there are sensitive lichens and bryophytes that are an important part of the ecosystem integrity.

⁸ These being swamp communities S4, S21 and S26 and saltmarsh communities SM8-SM16, SM24 and SM28 of the National Vegetation Classification.

has made ~~an assessment in relation to the qualifying pioneer saltmarsh habitats. Regardless, the results of the air quality impact assessment presented in Appendix E predicts no LSEs on qualifying habitats from nitrogen deposition-a precautionary assessment of this habitat (as duplicated in Appendix E).~~ The maximum nitrogen deposition, based on the 20 locations modelled for the Humber Estuary SAC and Ramsar site, is concluded to be 0.1kg N/ha/yr which represents 0.4% of the critical ~~levelload~~ for pioneer saltmarsh and is therefore below the threshold for insignificance.

6.2.50. ~~Upper saltmarsh has been assessed on a precautionary basis as the evidence that this habitat occurs within 200m is weak (given the observed predominance of common reed); it was not observed within 20m of the ARN. The only habitats observed within the latter area were bare mudflats, riparian common reed dominated vegetation and then an abrupt transition to adjacent non-coastal habitats. Regardless, the maximum nitrogen deposition represents 1% of the critical load within 20m of the Affected Road Network, which is the Station Road at Keadby Bridge. It then rapidly declines to less than 1% at greater distance. Therefore, the critical load is not exceeded for this habitat.~~

6.2.51. ~~Finally, considering the riparian common reed vegetation on the banks of the River Trent, the maximum nitrogen deposition would represent 0.7% of the critical load for rich fen vegetation (which is a very precautionary habitat type against which to assess species-poor common reed vegetation) and this is also below the threshold for insignificance.~~

6.2.52. ~~Acid deposition can adversely affect aquatic and terrestrial habitats. The acidification of rivers and streams by acid deposition has been shown to influence aquatic biota at all levels of the food chain. Growth of some plants may be affected by the reduced availability of dissolved inorganic carbon (DIC – required for photosynthesis), macronutrients such as phosphorus, and changes in inter-specific competition. APIS states that any effects within saltmarshes and comparable settings are “likely to be small as these habitats are inter-tidal and experience large influxes of nutrients”. In other words, the tidal regimes result in frequent flushing and dilution. Further, the~~

6.2.53. ~~There is no published critical load for common reed vegetation or a similar proxy vegetation type, with APIS stating only that the “wide ranging variation in [fen, marsh and swamp] vegetation types means responses to acid deposition have to be considered separately for the different ecosystem types and even within types” and that the “process of acidification is largely dependent on the hydrology.” Again, the tidal regimes are likely to result in flushing and dilution.~~

6.2.47-6.2.54. ~~An air quality assessment of acid deposition has been made against the only Humber Estuary specific habitat type for which data is~~

available in APIS. This air quality impact assessment (**ES Volume II Appendix 8A: Air Quality – Construction Phase (Application Document Ref. 6.3)**) concludes a maximum acid deposition change of less than 0.1% (**Appendix E**) of the critical load which is below the threshold for insignificance. Therefore, there are no predicted LSEs in relation to acid deposition.

~~6.2.48-6.2.55.~~ All other potential pollutants associated with vehicle emissions are also concluded to be insignificant so there would be no LSEs. Further, construction traffic movements would also be beyond the 200m screening distance for European Sites.

~~6.2.49-6.2.56.~~ Emissions from construction traffic will not result in LSE at the Humber Estuary SAC, SPA and Ramsar site or interfere with the ability of these sites to achieve their conservation objectives. The construction atmospheric pollution pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.

Water Pollution - Construction

~~6.2.50-6.2.57.~~ The potential water pollution risks arising during construction of the Proposed Development are assessed in **ES Volume I Chapter 12: Water Environment (Application Document Ref. 6.2)** and consider a worst-case zone of influence of 1km, along with case-by-case consideration of any potential for impacts to propagate further downstream via the flow of affected watercourses.

~~6.2.51-6.2.58.~~ Based on the assessment in Chapter 12, the only European Sites considered to be in the potential zone of influence of water pollution from construction activities are the Humber Estuary SAC and Ramsar site. If it occurred, water pollution could impact both the affected qualifying habitats and dependent qualifying species (birds and lamprey).

~~6.2.52-6.2.59.~~ Potential water pollution pathways are identified within **ES Volume I Chapter 12: Water Environment and Flood Risk (Application Document Ref. 6.2)**. In summary these pathways are:

- mobilisation of sediments within the River Trent from use of the Waterborne Transport Offloading Facility for Abnormal Indivisible Loads;
- mobilisation of sediments and release of pollutants during in-channel works within the Stainforth and Keadby Canal, including dewatering of cofferdams; and
- surface water drainage from construction areas.

~~6.2.53-6.2.60.~~ The first pathway would not result in LSEs. The River Trent is a highly turbid estuary and use of the Waterborne Transport Offloading

Facility, which is within an existing port facility, would add minimally to the existing baseline. This would not alter the structure and function of the estuary for lampreys given they only utilise the river for migration or adversely affect any qualifying habitat (which at this location is the estuary itself and unvegetated mudflats) or the suitability of this habitat for qualifying bird species.

~~6.2.54-6.2.61.~~ Boat traffic and unloading of cargo is also not likely to result in pollution of the River Traffic given pollution of the water environment is illegal under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016 and therefore needs to be prevented. ~~In support of this, the Navigation Authority (which is Associated British Port (ABP) Humber for the tidal section) will apply licence terms that require the prevention of pollution from the vessels.~~

~~6.2.62.~~ Installation and use of a cofferdam in the Stainforth and Keadby Canal is subject to an Environmental Permit issued by the Environment Agency. This will specify ~~requirements for prevention of environmental harm, and enforce Standard Rules for prevention of environmental harm and to achieve compliance with general environmental protection legislations (Environment Agency, 2019). Specifically, the standard minimum requirements for obtaining a permit for temporary dewatering operations comprise:~~

- ~~• competency requirements for site operatives and record keeping in relation to this;~~
- ~~• measures to minimise sediment mobilisation, for the correct storage and disposal of waste products, and to prevent pollution;~~
- ~~• all liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container;~~
- ~~• due regard to flood warnings and action to respond to flood warnings;~~
- ~~• reinstatement of the bed of the watercourse to the original condition;~~
- ~~and~~
- ~~• measures for biosecurity.~~

~~6.2.63.~~ ~~The measures needed to meet the above are covered within the standard embedded construction measures that are committed as summarised within **Chapter 12: Water Environment and Flood Risk (Application Document Ref. 6.2)** and allowed for within the Outline Water Management Plan (WMP) that forms part of the **Outline CEMP (Application Document Ref. 7.4)**. These measures are secured via the~~

Water Management Plan (WMP) that will form a technical appendix to the final CEMP. Further information on this is provided below.

6.2.55-6.2.64. Further, should a barge be needed for the installation of the cofferdam then the Navigation Authority (which is the Canal and River Trust) will also enforce the measures that need to be provided to prevent pollution from vessels that they licence on their waters. The Canal and River Trust business boat licence prohibits all discharges from a boat (other than unpolluted surface water) to waterways. Any specific requirements enforced by the licence terms can be captured within the Final CEMP.

6.2.56-6.2.65. Should cofferdam installation work in the Stainforth and Keadby Canal mobilise sediments these would be unlikely- to reach the Humber Estuary SAC and Ramsar site through the lock gate on the canal after consideration of standard construction practice to comply with legislative requirements. Given the lock gate is typically closed, these sediments are also likely to resettle before the lock gate is re-opened. Should some sediment make it through the lock gate then this would be within the context of a highly turbid estuary and would add minimally to the existing baseline.

6.2.57-6.2.66. Once the cofferdam has been installed, any fine sediment that has been mobilised will quickly dissipate through settling or dispersion and is unlikely to create a plume that may propagate into the wider waterbody. The purpose of the cofferdam is to allow a dry working area to be created, which in itself is a measure designed partly to reduce adverse impacts on water quality.

6.2.58-6.2.67. Construction works to install the cooling water intake structure would be within the dewatered area of the river channel i.e. inside the cofferdam. So during construction, these works could not result in pollution of the canal and therefore the downstream European Sites as the working area will not be connected to the canal at that point in time. The Environmental Permit (consistent with the standard permitting terms described in Environment Agency, 2019) will require that the affected dewatered area be reinstated to an appropriate condition before removal of the cofferdam.

6.2.59-6.2.68. Construction works at the Main Site and Ancillary Facilities could result in pollution (e.g. sediments, inert particulates, litter, hydrocarbons, metals, nutrients and de-icing salts) to Drain 1 (Glew Drain) if inadequate control measures are put in place to prevent this. Any discharge to Drain 1 could only reach the River Trent and therefore the European Sites after first passing through an extensive (approximately 3.8km) drain network. This would involve flow westwards away from the River Trent, then north

to join the Warring Drain, which then flows westwards to join the River Trent. Flow into the River Trent is controlled by a tidal lock.

~~6.2.60~~6.2.69. If pollution of the water environment was to occur during construction, it would result in offences under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016 (UK Government 2015 and 2016). As such, the Applicant as a responsible developer would adopt all construction methods and measures necessary to prevent such pollution and in so doing achieve legislative compliance. These measures are required irrespective of any nature conservation designations applied to the watercourses concerned so they do not represent mitigation for LSEs on European Sites. They are otherwise also expected to be secured via the Environmental Permit that would need to be obtained to permit the proposed construction activities.

~~6.2.61~~6.2.70. The standard embedded construction measures that are committed are summarised within **Chapter 12: Water Environment and Flood Risk (Application Document Ref. 6.2)** and allowed for within the Outline Water Management Plan (WMP) that forms part of the **Outline CEMP (Application Document Ref. 7.4)**. These measures are secured via the Water Management Plan (WMP) that will form a technical appendix to the final CEMP. The relevant standard measures are:

- application of standard good practice contained within Guidance for Pollution Prevention;
- measures to manage fine sediment in surface water runoff as a result of construction activities (which includes infilling of minor ditches) and protect waterbodies;
- measures to manage the risk of accidental spillages and potential conveyance to nearby waterbodies via surface runoff or land drains, including bunded areas and distribution of spill kits;
- any cofferdam would be designed to minimise changes to the canal bed and bank erosion and toe scour by extending the minimum distance required into the channel. Silt curtains would be used to minimise impacts on water quality. Given the minimal flow in the Stainforth & Keadby Canal, scour risk here is not deemed to require additional protection;
- dewatering within the cofferdam area will be undertaken once any fine sediment has settled out such that it is consistent with the turbidity of the waterbody (Stainforth & Keadby Canal). The rate and location of the discharge will be controlled and carefully chosen to avoid further erosion of any nearby soft sediments;

- small volumes of localised pumping to dewater excavations (including water ingress/seepage into cofferdams once installed) will be discharged to ground close to the excavation or surface water;
- water with a higher risk of contamination which requires discharge, such as groundwater pumped out during concrete pouring, would be contained and treated using appropriate measures such as coagulation of sediments, dewatering and pH neutralisation prior to discharge. Alternatively, e.g. should there be an oil spillage, the water would be tankered offsite for offsite disposal/neutralisation;
- incorporate measures to prevent an increase in flood risk during the construction works; and
- a water quality monitoring programme to be further developed by the principal contractor in consultation with the Environment Agency and other relevant parties during the process of obtaining Environmental Permits/ Consents/ Licences for works affecting, or for temporary discharges to, waterbodies during the construction period.

6.2.62-6.2.71. Consequently, **ES Volume I Chapter 12 (Application Document Ref. 6.2)** predicts a negligible ('de minimis') temporary impact (for the duration of the construction works in the canal) on the Humber Estuary SAC and Ramsar site. This would not alter the structure and function of the estuary for lampreys or adversely affect any qualifying habitat or bird features, so there are no LSEs.

6.2.63-6.2.72. This construction water pollution pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.
[Temporary or Permanent Impacts on Foraging Resources - Construction](#)

6.2.64-6.2.73. The Humber Estuary SPA and Ramsar site is designated for breeding and overwintering birds that forage on invertebrates or small fish and therefore could be present in the vicinity of the Site. Adult river lamprey for which the Humber Estuary SAC and Ramsar site is designated will spend one to two years feeding on fish in estuaries before returning to breeding grounds, so they may feed within the tidal section of the River Trent. Sea lamprey primarily feeds at sea and ceases feeding before entering river systems on migration to breeding grounds so does not need to be considered further).

6.2.65-6.2.74. The permanent loss of habitats for the Proposed Development would not adversely affect foraging resources for qualifying bird species (there is no loss of aquatic habitat relevant to lampreys). The Main Site supports 13ha of species-poor grassland but it is encroached by existing development, including an overhead powerline, and is adjacent to existing operational areas (Keadby Wind Farm, Keadby 1 and 2 Power Stations

and the National Grid substation). As such, there is no reasonable likelihood that the Main Site, which is enclosed by trees and industry, would have specific importance as functionally linked foraging habitat for qualifying bird species. This is supported by the BTO Data Report (**Appendix D**) and other bird data used to make the assessment of the construction noise pathway. These datasets identify no notable aggregations of qualifying bird species within the 10km grid square containing the Site. This habitat has already been consented for loss in relation to the Keadby CCS Power Station DCO. The Proposed Development is an alternative to this consented development- (i.e. only one of the two developments would be implemented).

~~6.2.66~~6.2.75. Potential temporary impacts on the foraging resources of qualifying bird species and river lamprey during construction relate to most of the pathways assessed above: Specifically:

- habitat disturbance and modification could affect fish and invertebrates – no LSEs were identified so no LSEs on foraging resources would occur from this pathway;
- noise and vibration could adversely affect the fish species that qualifying birds and river lamprey feed on – noise and vibration LSEs were identified in relation to the functionally linked habitat of the Stainforth and Keadby Canal and this was taken forward to Appropriate Assessment. The canal habitat could be used by fish feeding bird species, but river lamprey would not feed in the canal. There is no noise and vibration impact on the estuary habitat of the River Trent which is the only location where river lamprey would be expected to feed on fish;
- atmospheric pollution could affect habitat structure and function of potential supporting habitats to the detriment of fish and invertebrate prey species – after consideration of the potential supporting habitats identified by Natural England (2019⁹) no atmospheric pollution LSEs were identified so no LSEs on foraging resources would occur from this pathway; and
- water pollution could have a direct toxic effect on prey species or affect habitat structure and function to the detriment of prey species – no

⁹ In aggregate these are listed as: Atlantic salt meadows, coastal lagoons, freshwater and coastal grazing marsh, intertidal mixed sediments, intertidal mud, intertidal sand and muddy sand, Salicornia and other annuals colonising mud and sand, the water column (for avocet and tern), intertidal seagrass beds, coastal reedbeds, other reedbeds within the tidal reach of the estuary (with specific emphasis on pools within these reedbeds), arable land and permanent pasture.

water pollution LSEs were identified so no LSEs on foraging resources would occur from this pathway.

~~6.2.67-6.2.76.~~ Given, the ~~last~~ noise and vibration pathway was screened in in relation to direct effects on qualifying bird species, the impact on foraging resources pathway is also **screened in** for Appropriate Assessment in relation to qualifying bird species. All other pathways relevant to birds and river lamprey are screened out from Appropriate Assessment as they would not affect the conservation objectives.

Mortality and Barriers to Lamprey Movement - Construction

~~6.2.68-6.2.77.~~ The pathways for lamprey mortality relate to installation of a cofferdam in the Stainforth and Keadby Canal for construction of the Canal Water Abstraction, as described above in relation to construction noise and vibration. This pathway considers potential physical impacts or physical barriers to lampreys unrelated to noise and vibration.

~~6.2.69-6.2.78.~~ There would be no physical barriers to lamprey movement as the cofferdam would extend into the channel of the canal no further than the maximum extent of the Order Limits. As such, it would occupy no more than half the width of the canal and consequently it would not block fish passage within the Stainforth and Keadby Canal. Similarly, the cofferdam would not alter flow regimes within the canal given it is a static to slow flowing waterbody.

~~6.2.70-6.2.79.~~ In the unlikely event (given the limited potential for lampreys to access the canal due to the presence of lock gates) that individual lampreys are captured within the cofferdam then they would be treated in the same manner as all other fish to achieve legislative compliance and consequently there are no LSE. This is necessary irrespective of the presence of European Sites. The Environmental Permit for the cofferdam will require that standard fish protection measures be implemented during dewatering of cofferdams, as this is a typical requirement of such permits (Environment Agency, 2019). Any lampreys incidentally trapped within the cofferdams would be protected and returned to the main channel in accordance with the requirements that will be set in the Environmental Permit. This committed standard good practice approach is described within **ES Volume I Chapter 11: Biodiversity and Nature Conservation (Application Document Ref. 6.2)** and the **Outline CEMP (Application**

Document Ref. 7.4). It will be secured via the final CEMP and the Environmental Permit.

~~6.2.71-6.2.80.~~ The construction lamprey movement and mortality pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.

6.3. Operation

Habitat Disturbance and Modification - Operation

- 6.3.1. The outflow of discharged treated effluent into the River Trent could, if not appropriately regulated, cause scour and erosion of intertidal mudflat habitats within the Humber Estuary SAC and Ramsar site. The treated effluent discharge from the Proposed Development will be within the parameters considered and agreed previously when determining the application for the consented Keadby CCS Power Station. The HRA for Keadby CCS Power Station concluded no LSE and this conclusion was agreed by the Competent Authority. As such, if the discharge from Keadby CCS Power Station was acceptable and would not result in LSE, reasonably this conclusion should apply to the Proposed Development also.
- 6.3.2. The above stated, the Proposed Development commits to operating within the parameters of the existing consented discharge from Keadby 1 and 2 Power Stations, so no additional impacts would ~~not~~ arise that are attributable to the Proposed Development.
- 6.3.3. It is anticipated that the volume of discharge from the Proposed Development will be less than 1m³/s and would typically discharge intermittently, in combination with the 0.016m³/s that is discharged from Keadby 2 Power Station. As such, the Proposed Development will be operating well within the parameters of what was determined to be not significant for Keadby 1 Power Station, where the existing permit (EPR/YP3133LL/V011) allows a maximum daily discharge of 15m³/s (average of 24-hour period).
- 6.3.4. Keadby CCS Power Station has already been granted an amended Environmental Permit (EPR/YP3133LLv013) to discharge within these parameters. The Environment Agency, as the regulator, reviewed the Water Impact Assessment prepared for and submitted with the permit application for Keadby CCS and ~~also~~ undertook a HRA. It was concluded that there would no adverse effect on the integrity of the Humber Estuary SAC and Ramsar site from the discharge of treated effluent. This assessment was shared with Natural England who raised no concerns. A separate water impact assessment will behas been prepared and submitted for the Environmental Permit application for the Proposed Development but it is anticipated and this confirms that the Proposed

Development ~~would be able to~~will discharge within the same parameter constraints of the existing Keadby CCS Power Station Environmental Permit. ~~Environmental Permit. i.e. no change from the existing baseline.~~

- 6.3.5. Further, should Keadby 1 Power Station be decommissioned in the future then that would remove the primary source of discharge and the outflow of treated effluent, and any pre-existing baseline scour effect would ~~be reduced as a consequence~~reduce consequently.
- 6.3.6. The operational habitat modification pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.
Noise, Vibration and Visual Disturbance - Operation
- 6.3.7. During operation, the only direct interaction of the Proposed Development with European Sites is the discharge of treated effluent to the River Trent in combination with the water discharges from Keadby 1 and Keadby 2 Power Stations. Operation of the outfall would remain consistent with the established usage by Keadby 1 and Keadby 2 Power Stations. So, the baseline airborne and underwater noise and vibration from operation of this infrastructure would not change.
- 6.3.8. The same is also true for potential visual and noise disturbance from maintenance activities. It is likely that the water outfall structure will need periodic maintenance during the operational life of the Proposed Development. Maintenance needs in relation to the outfall structure also have direct relevance for the routine operation of the consented Keadby 1 and 2 Power Stations. Given this, it is not an issue specifically related to the Proposed Development as periodic maintenance would be needed with or without the Proposed Development. There would therefore be no new maintenance impact specific to the Proposed Development.
- 6.3.9. Accordingly, no adverse noise or visual disturbance from operation and maintenance of existing water outfall structure is considered likely as no changes from the existing baseline maintenance regimes are anticipated.
- 6.3.10. The wider Proposed Development would not result in airborne noise levels that could affect these European Sites. The noise modelling undertaken for the Proposed Development (**Figure 4**) confirms that noise levels would not exceed 50dB at the European Sites, indeed it is likely to be less than the existing baseline sound levels.
- 6.3.11. Operational noise levels at NSR 3 and NSR 4, which (as explained in Section 6.2) provide proxies for the noise levels received at the River Trent, would be 42 and 41dB respectively (refer to **ES Volume I, Chapter 9: Noise and Vibration (Application Document Ref. 6.2)**). In comparison the existing worst-case baseline ambient sound levels at these locations is in the order of 56 and 57dB respectively, so operational noise from the

Proposed Development would be less than, and therefore imperceptible against, the existing baseline that birds are habituated to.

- 6.3.12. Noise levels could reach farmland of potential value for certain qualifying bird species (as reviewed in more detail in relation to this pathway during construction). The noise modelling (**Figure 4**) undertaken for the Proposed Development indicates that operation could result in noise levels at farmland of more than 50dB so there could be LSEs.
- 6.3.13. Visual disturbance is not likely during operation given the limited operational presence and the restriction of activities to the Site where there will be screening from buildings, fences and habitat buffers from adjacent land.
- 6.3.14. The potential noise disturbance pathway remains **screened in** for Appropriate Assessment in relation to the operational noise pathway for impacts on qualifying bird species that might use agricultural land and/or the Stainforth and Keadby Canal. All other noise, vibration and visual disturbance pathways for impacts on qualifying species (birds and lampreys) are screened out.

Invasive Non-Native Species - Operation

- 6.3.15. The Preliminary Ecological Appraisal of the Proposed Development (**ES Volume II Appendix 11C (Application Document Ref. 6.3)**) identified the presence of zebra mussel, demon shrimp and Nuttall's waterweed within the Stainforth and Keadby Canal. Should the Canal Water Abstraction Option be implemented, then there is a theoretical pathway for dispersal of propagules of these Invasive Non-Native Species (INNS) to the Humber Estuary SAC and Ramsar site via the cooling water discharge into the River Trent.
- 6.3.16. While acknowledging the theoretical impact pathway for dispersal of INNS, this is not likely given the implications of these species for effective operation of the Proposed Development. Zebra mussel has the potential to settle and proliferate within water supply infrastructure such that, without intervention, it would be likely (ultimately) to cause a failure of this infrastructure.
- 6.3.17. This has been taken account within the design (as was also the case for Keadby CCS Power Station). The screening required at the water intake to comply with the Eels (England and Wales) Regulations 2009 (UK Government, 2009) is suitable to exclude plant material and animals above 2mm size from the water supply. In addition, approved sodium hypochlorite biocide treatments will be used to control smaller life stages and propagules within cooling water pipework to avoid operational damage to the Power Station. As such, the design and operational parameters for the Proposed Development preclude potential for dispersal

of viable propagules of INNS to the River Trent as they must be excluded or treated at source to protect the Proposed Development from damage.

- 6.3.18. It should also be noted that currently there are no existing barriers to the dispersal of the above species from the canal to the River Trent, as water overtops the existing lock structure at the point of junction between these two waterbodies, allowing for mixing of waters. The lock gate is therefore permeable to INNS.
- 6.3.19. Given the design and operational parameters and other relevant considerations, operation of the Proposed Development is not likely to result in the spread of INNS and therefore will not result in LSE at the Humber Estuary SAC and Ramsar site. The operational INNS pathway is therefore **screened out** from Appropriate Assessment as it would not adversely affect qualifying species or habitats of the relevant European Sites and therefore it would not affect the conservation objectives of these European Sites.

Atmospheric Pollution - Operation

- 6.3.20. The Proposed Development and in particular, emissions from the combined cycle gas turbine (CCGT) will give rise to atmospheric emissions during the operational phase (**ES Volume II Appendix 8B: Air Quality – Operational Assessment (Application Document Ref. 6.3)**). The CCGT unit will generate electricity through the combustion of natural gas until a technically and commercially viable hydrogen supply chain option becomes available.
- 6.3.21. The resulting combustion gases from both modes of firing will contain NO_x, a pollutant that can be toxic to vegetation in addition to contributing to nitrogen and acid deposition. However, regulatory regimes dictate that NO_x concentrations be minimised to achieve BAT-Achievable Emission Levels (BAT-AEL) in the case of gas-firing, or in the case of hydrogen firing, Emission Limit Values (ELVs) provided within 'Guidance for Emerging Technologies' (Environment Agency, Natural Resources Wales, Department of the Environment (Northern Ireland) & The Scottish Government, 2024). The relevant BAT-AELs and GET ELVs have been modelled for the two operational scenarios assessed.
- 6.3.22. Unlike combustion of conventional fuels, hydrogen firing does not produce direct emissions of carbon dioxide (CO₂) and therefore there is a reduction in volume of the resulting flue gas. This means that the resulting concentration of NO_x in the flue gas when the CCGT is fired on hydrogen is higher than when fired on natural gas.
- 6.3.23. A NO_x abatement system such as Selective Catalytic Reduction (SCR) may be required at final design to achieve the required maximum NO_x emission concentrations for the Proposed Development (but not to

mitigate impacts on European Sites). SCR reduces NOx concentrations by spraying urea (or other forms of ammonia) into the flue gas and therefore has the potential to result in 'ammonia slip' with a resulting emission of ammonia. Emissions of ammonia have therefore also been included in the assessment.

- 6.3.24. Negligible sulphur dioxide or dust will be emitted since the Proposed Development will be natural gas / hydrogen-fired and these fuels contain minimal levels of sulphur and particulates, so this does not require air quality impact assessment.
- 6.3.25. An initial worst-case Atmospheric Impact Assessment (AIA) was undertaken to determine the potential air quality impacts arising from NOx and ammonia emissions and nitrogen and acid deposition from the operational power station atmospheric utilising dispersion modelling, for a study area of 15km from the Main Site (**ES Volume II Appendix 8B (Application Document Ref. 6.3)**). The results are provided within **Appendix E**.
- 6.3.26. Specific significance criteria relating to impacts on sensitive designated ecological receptors are set out within the Environment Agency air emissions risk assessment guidance. For the purposes of HRA, the impact of stack emissions can be regarded as insignificant and therefore there would be no LSEs at sites with statutory designations if:
- the long-term Process Contribution (PC) ~~is less than~~ does not exceed 1% of the critical level; and
 - the short-term PC is less than 10% of the critical level.
- 6.3.27. APIS provides information on site relevant critical levels for atmospheric NOx concentrations for the protection of vegetation of ~~30µgm~~30µg/m⁻³ and critical levels of either ~~3µgm~~3µg/m⁻³ or 1µgm⁻³ for ammonia (depending on the sensitivity of the species present, ~~with the~~ The critical level of 3µgm⁻³ being applicable to less sensitive higher plant species, and the critical level of ~~4µgm~~1µg/m⁻³ being applicable ~~to where~~ more sensitive lichen and bryophyte species); are integral to the integrity of the ecosystem being assessed. In addition, ecological studies have determined 'critical loads' for atmospheric nitrogen deposition (i.e. nitrogen derived from NOx and ammonia) and acid deposition. Critical load criteria for the deposition of nitrogen and acid reflect the qualifying habitats and species present.
- 6.3.28. The assessment of NOx has been made with reference to the upper critical load as bryophytes and lichens are not integral to the qualifying vegetation features of the Humber Estuary designations (as explained in more detail within the construction atmospheric pollution assessment, Section 6.2). The air quality assessment results (**Appendix E**) show that process contributions (PCs) of more than 1% of the annual average critical level for NOx occur at the adjacent Humber Estuary SAC and Ramsar site.

This result could also have implications for the qualifying bird species of the Humber Estuary SPA should it affect the quality of functionally linked habitat for these bird species. Given this, NO_x remains **screened in** for Appropriate Assessment in relation to the potential impacts and effects on qualifying habitats of the Humber Estuary ~~SAC and Ramsar~~ Sitedesignations.

- 6.3.29. No exceedances of the annual critical level for NO_x are predicted for the ~~Humber Estuary SPA and the~~ Thorne and Hatfield Moors designations. So, there are no LSE from NO_x, and it can be **screened out** of Appropriate Assessment in relation to these European Sites as it would not affect the conservation objectives.
- 6.3.30. The worst-case air quality assessment results (**Appendix E**) show that the predicted ammonia concentrations would be more than 1% of the annual average critical level for at the adjacent Humber Estuary SAC and Ramsar site. This result could also have implications for the qualifying bird species of the Humber Estuary SPA should it affect the quality of functionally linked habitat for these bird species. Given this, ammonia remains **screened in** for Appropriate Assessment in relation to the potential impacts and effects on qualifying habitats of the Humber Estuary ~~SAC and Ramsar~~ Sitedesignations.
- 6.3.31. Ammonia concentrations received at ~~the Humber Estuary SPA and~~ the Thorne and Hatfield Moors designations would be less than 1% of the relevant critical level. So, there are no LSE from ammonia and it can be **screened out** of Appropriate Assessment as it would not affect the conservation objectives.
- 6.3.32. The worst-case air quality assessment results show that the predicted acid deposition would be less than 1% of the relevant critical load at all European Sites and therefore it can be considered insignificant. So, there are no LSE from acid deposition and it can be **screened out** of Appropriate Assessment as it would not affect the conservation objectives of any of the European Sites.
- 6.3.33. The only type assessment of nitrogen deposition has considered the qualifying habitat features within the zone of influence relevant to the operational assessment i.e.:
- estuaries – encompassing the main river channel;
 - mudflats and sandflats not covered by seawater at low tide – encompassing the marginal mud banks exposed at low tide;
 - pioneer saltmarsh;
 - upper saltmarsh; and
 - common reed vegetation fringing the River Trent.

6.3.34. During the examination of the Keadby CCS Power Station DCO, Natural England initially advised that this species-poor riparian vegetation of common reed (*Phragmites australis*) on the banks of the River Trent should be considered saltmarsh in the context of the Humber Estuary SAC and Ramsar site. However, following further review and discussion, it was agreed that this vegetation is not of a type listed as a qualifying interest feature of these sites, as set out in Section 5.3. However, during more recent consultations on the Proposed Development it was advised that the fringing common reed vegetation still needed to be considered part of the estuary habitat.

~~6.3.33-6.3.35.~~ Two types of saltmarsh vegetation are identified as a qualifying feature ~~is the features i.e.~~ 'Salicornia and other annuals colonising mud and sand' saltmarsh. This pioneer saltmarsh, and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) which is upper saltmarsh. The former pioneer saltmarsh vegetation that colonises intertidal mud and sandflats in areas protected from strong wave action and is an important precursor to the development of more stable saltmarsh vegetation. It only develops at the lower reaches of saltmarshes so it is restricted to the main Estuary (see also Section 6.2 for further comment on this) and does not occur on the River Trent at Keadby and therefore does not require assessment in relation to OE1-5 (although it has been modelled). However, an impact assessment is provided below for the pioneer saltmarsh where the vegetation is frequently flooded by the tide, and can also colonise open creek sides, depressions or pans within saltmarshes, as well as disturbed areas of upper saltmarshes (JNCC, 2025). it occurs at the main Estuary.

6.3.36. The worst-case air quality assessment (**ES Volume II Appendix 8B (Application Document Ref. 6.3)**) predicts nutrient nitrogen deposition of 0.32kg N/ha/year at the Humber Estuary SAC and Ramsar site for the worst gas firing scenario. ~~A lower critical load of 20kgN/ha/yr is set for estuary habitats in relation to pioneer saltmarshes and this has been used for assessment of nitrogen deposition at the River Trent at Keadby (Receptor IDs OE1-5, Appendix E) as it is the appropriate load for the qualifying saltmarsh habitat type.~~

~~6.3.34-6.3.37.~~ There is no specified critical load for the mudflat habitats present at OE1-5 as they would not reasonably have one. All the studies into critical loads are based on rooted macrophytes, so there isn't anything applicable to entirely unvegetated habitats as ~~there is no vegetation to be affected~~ they do not support vegetation¹⁰. So, no further assessment of the

¹⁰ Fluvial nitrogen inputs can be related to excessive macroalgal growth in the marine environment but recent Natural England guidance to planners issued in March 2022 does not identify the Humber Estuary as being an affected European site for which this

mudflat is required, The estuary habitat is addressed through consideration of its transitional common reed vegetation, as the only component non-marine habitat (other than the saltmarsh types) that could be affected by nitrogen.

6.3.38. Utilising the worst-case precautionary critical load for upper saltmarsh, the nitrogen deposition at OE1-5 equates to 3.2% of the lower critical load of 10kgN/ha/yr so there is an LSE if upper saltmarsh occurs in the zone of influence of the Proposed Development.

6.3.39. The air quality assessment has ~~also~~ considered the potential for air quality impacts to common reed vegetation at Keadby (OE1-5) and other qualifying reedbed habitats located at the main Humber Estuary (Receptor ID OE32, **Appendix E**). At ~~this location~~both locations the most sensitive qualifying habitats align best with the APIS habitat type of rich fen- (albeit this alignment is very precautionary in relation to the riparian common reed vegetation at Keadby). This has a lower critical load of 15kgN/ha/yr. ~~This is also the location of the pioneer saltmarsh habitat which, as identified above, has a critical load that is higher than rich fen i.e. it~~

6.3.35. In relation to the riparian common reed vegetation fringing the River Trent at Keadby (OE1-5), the worst-case nitrogen deposition is less sensitive to nitrogen than rich fen.

6.3.36. Utilising the worst case precautionary critical load for pioneer saltmarsh, the nitrogen deposition equates to 2.1.6% of the critical load ~~at OE1-5~~. So there is a LSE if pioneer saltmarsh occurs in the zone of influence of the Proposed Development.

6.3.37-6.3.40. The qualifying mudflat and estuary habitats that are present at OE1-5 are not sensitive to nitrogen deposition as they do not support vegetation⁴⁴an LSE that requires Appropriate Assessment.

6.3.38-6.3.41. In relation to the more sensitive rich fen habitat which is only present at the main Humber Estuary (OE32), the nitrogen deposition is 0.6% of the critical load. The worst-case air quality assessment results therefore show that the predicted nitrogen deposition would be less than

is a concern, and fluvial and marine sources of nitrogen will dwarf inputs from the atmosphere.

~~⁴⁴Fluvial nitrogen inputs can be related to excessive macroalgal growth in the marine environment but recent Natural England guidance to planners issued in March 2022 does not identify the Humber Estuary as being an affected European site for which this is a concern, and fluvial and marine sources of nitrogen will dwarf inputs from the atmosphere.~~

1% of the relevant critical load at this location and therefore nitrogen deposition can be considered insignificant ~~in relation to all other qualifying habitats of the Humber Estuary SAC and Ramsar site. So, there are no LSE from nitrogen deposition onto qualifying habitats other than the LSE identified above in relation to pioneer saltmarsh.~~

~~6.3.42.~~ The closest mapped occurrence of the pioneer saltmarsh qualifying feature is more than 9km to the northwest and coincides more closely with the Humber receptor OE32 as assessed within Appendix 8B, the results for which are provided in Appendix E. At this location there would be no exceedances of the critical load for this habitat.

~~6.3.39-6.3.43.~~ Given the above, nutrient nitrogen deposition remains **screened in** for Appropriate Assessment in relation to the potential impacts and effects on the qualifying ~~pioneer~~upper saltmarsh habitat **and common reed vegetation** of the Humber Estuary SAC and Ramsar site. ~~(which is also potential functionally linked habitat for qualifying birds of the Humber Estuary SPA).~~

~~6.3.40-6.3.44.~~ The 1% threshold is not exceeded at the Humber Estuary SPA (OE32) and the Thorne and Hatfield Moors designations. So, there are no LSE from nutrient nitrogen deposition on the qualifying features of these European Sites and they are **screened out** of Appropriate Assessment as it would not affect their conservation objectives.

~~6.3.41-6.3.45.~~ No quantitative assessment of traffic emissions during the operational (including maintenance) ~~period~~ has been made, as the numbers of additional vehicles associated with the operational phase of the Proposed Development are below the National Highways Design Manual for Roads and Bridges (DMRB) (Highways England, 2019) and Institute for Air Quality Management (IAQM, 2017) screening criteria for requiring such assessment. In addition, the predicted impacts for the construction phase traffic emissions show that the effect of additional construction traffic will be not significant at all identified receptors (**Appendix 8A: Air Quality – Construction Assessment, ES Volume II - Application Document Ref. 6.3**). The number of additional vehicles for the operational phase, including outages required for maintenance, is well below the numbers assessed for the construction phase and therefore it is considered that the effect of operational traffic is also not significant.

~~6.3.42-6.3.46.~~ Traffic movements would therefore have a negligible effect on air quality. Pollution from operational vehicle movements is therefore

screened out from Appropriate Assessment as it would not affect the conservation objectives set for any of the European Sites.

Water Pollution - Operation

~~6.3.43-6.3.47.~~ 6.3.47. The potential water pollution risks arising during operation of the Proposed Development are assessed in **ES Volume I Chapter 12: Water Environment (Application Document Ref. 6.2)** and consider a worst-case zone of influence of 1km, along with case-by-case consideration of any potential for impacts to propagate further downstream via the flow of affected watercourses.

~~6.3.44-6.3.48.~~ 6.3.48. Based on the assessment in Chapter 12, the only European Sites considered to be in the potential zone of influence of water pollution from construction activities are the Humber Estuary SAC and Ramsar site. If it occurred, water pollution could impact both the affected qualifying habitats and dependent qualifying species (birds and lamprey).

~~6.3.45-6.3.49.~~ 6.3.49. Potential pathways for impacts from water pollution assessed in Chapter 12 relate to:

- surface water drainage; and
- discharges of treated effluent to the River Trent.

~~6.3.46-6.3.50.~~ 6.3.50. During operation, surface water runoff from the Proposed Development may contain pollutants derived from urban surfaces (e.g. inert particulates, litter, hydrocarbons, metals, nutrients and de-icing salts). This mixture of pollutants is collectively known as ‘urban diffuse pollutants,’ and although each pollutant may itself not be present in harmful concentrations, the combined effects over the long term can cause chronic adverse impacts. In the worst-case event of a fire, firewater also represents a potential pollutant.

~~6.3.47-6.3.51.~~ 6.3.51. The increased area of impermeable surfaced area within the Site (relative to the baseline) may lead to increases in the rate and quantities of these pollutants from the Site to receiving watercourses, although it is noted that high risk areas would be bunded with water managed separately.

~~6.3.48.~~ The preferred option is to discharge surface water drainage from the Proposed Development to Drain 1 (Glew Drain) which would be subject to agreement from the Internal Drainage Board. ~~Alternatives are also being considered, in which case a Sustainable Drainage System (SuDS) is likely to be provided in the form of ditches, swales and an attenuation pond. The~~

~~maintenance required for SuDS and drainage networks will be based on standard guidance and practice.~~

~~6.3.49-6.3.52.~~ Any discharge to Drain 1 could only reach the River Trent and therefore the European Sites after first passing through an approximately 3.8km drain network. This would involve flow westwards away from the River Trent, then north to join the Warring Drain, which then flows eastwards to join the River Trent. Flow into the River Trent is controlled by a tidal lock.

~~6.3.50-6.3.53.~~ A new surface water drainage network and management system will be provided for the Site that will provide adequate interception, conveyance, treatment, and attenuation of surface water runoff from buildings and hard standing. This is necessary to achieve legislative compliance as the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016 make water pollution illegal.

~~6.3.54.~~ The proposed surface water drainage system is to include the use of a Sustainable Drainage System (SuDS) to provide treatment of runoff from areas where there is a low risk. The maintenance required for SuDS and drainage networks will be based on standard guidance and practice.

~~6.3.51-6.3.55.~~ The proposed concept Drainage Strategy is provided in Annex 3 of **ES Volume II Appendix 12A (Application Document Ref. 6.3.16)**. The detailed design of the surface water drainage system is secured by a Requirement in the **Draft DCO (Application Document Ref. 3.1)**. Appropriate requirements for long-term monitoring of water quality is a matter for the permitting regime and this will therefore be agreed with the Environment Agency and secured through the permitting process. The Proposed Development will not be permitted to operate until the necessary Environmental Permit has been obtained.

~~6.3.52-6.3.56.~~ The Proposed Development also requires a supply of cooling water for heat rejection purposes. The proposed cooling method will utilise water abstracted from the Stainforth and Keadby Canal (Canal Water Abstraction). Treated effluent will be discharged to the River Trent and therefore the Humber Estuary SAC and Ramsar site under an Environmental Permit. The discharge will be via the existing outfall structure that was originally installed to serve Keadby 1 Power Station, and which also serves Keadby 2 Power Station. Prior to discharge, the treated effluent from the Proposed Development will be mixed with the existing effluent discharge from Keadby 2 Power Station and the cooling water discharge from Keadby 1 Power Station. Effluent could, if not

adequately treated and monitored prior to discharge, contain potential pollutants, including residual biocides and other blowdown products.

~~6.3.53-6.3.57.~~ Throughout its lifetime, the quality of water discharges from the Proposed Development would be regulated by the Environment Agency through an Environmental Permit. If required, the permit and licence would control the handling, storage and use of hazardous materials, including emergency procedures in line with the use of Best Available Techniques (BAT). These measures would be in place to achieve the water quality and temperature limits set by the Environmental Permit for the treated effluent and by in so doing prevent environmental harm.

~~6.3.54-6.3.58.~~ Not all ~~of~~ the design measures to achieve BAT and secure the Environmental Permit are sufficiently defined, because they are subject to the detailed design work that will be undertaken post-determination. Therefore, the surface water pollution pathway remains **screened in** for Appropriate Assessment.

Impacts on Foraging Resources - Operation

~~6.3.55-6.3.59.~~ The Humber Estuary SPA and Ramsar site is designated for breeding and overwintering birds that forage on invertebrates or small fish and therefore could be present in the vicinity of the Site. Adult river lamprey for which the Humber Estuary SAC and Ramsar site is designated will spend one to two years feeding on fish in estuaries before returning to breeding grounds, so they may feed within the tidal section of the River Trent. Sea lamprey primarily feeds at sea and ceases feeding before entering river systems on migration to breeding grounds so does not need to be considered further).

~~6.3.56-6.3.60.~~ Potential impacts on the foraging resources of qualifying bird species and river lamprey during operation relate to most of the pathways assessed above: Specifically:

- habitat disturbance and modification could affect fish and invertebrates – no LSEs were identified so no LSEs on foraging resources would occur from this pathway. The assessment provided from paragraph 6.3.1 applies here, as the Proposed Development would not alter sediments loads or transportation relative to the baseline within this turbid estuary;
- noise and vibration could adversely affect the fish species that qualifying birds and river lamprey feed on – no LSEs were identified so no LSEs on foraging resources would occur from this pathway;
- atmospheric pollution could affect habitat structure and function to the detriment of fish and invertebrate prey species – atmospheric pollution LSEs were identified in relation to the Humber Estuary SAC and

Ramsar site and this pathway was taken forward to Appropriate Assessment; and

- water pollution could have a direct toxic effect on prey species or affect habitat structure and function to the detriment of prey species – water pollution LSEs were identified in relation to the Humber Estuary SAC and Ramsar site and this pathway was taken forward to Appropriate Assessment.

~~6.3.57-6.3.61.~~ Given, the two pollution pathways were screened in, the impact on foraging resources pathway is also **screened in for Appropriate Assessment in relation to qualifying bird species and river lamprey**. All other pathways relevant to birds and river lamprey are screened out from Appropriate Assessment as they would not affect the conservation objectives.

~~6.3.58. Operation of the Proposed Development will not affect the estuary and mudflat habitats within the River Trent in the area for the reasons given above under atmospheric and water pollution. Operational impacts on foraging resources are therefore **screened out** from Appropriate Assessment as it would not affect the conservation objectives.~~

Mortality and Barriers to Lamprey Movement - Operation

~~6.3.59-6.3.62.~~ The water supply for the Proposed Development is the Stainforth and Keadby Canal. ~~On the assumption that~~ **Should** the canal ~~represents~~ **represent** habitat for lampreys and ~~could be~~ **important** ~~used~~ for migration¹², water abstraction could represent a potential pathway for injury and mortality of ~~any lampreys that are able to bypass the existing barriers posed by lock gates to enter the canal~~. The pathway could operate through impingement (the capture and trapping of organisms on intake screens) and/or entrainment (the passing of small organisms

~~¹² Which is unevidenced and speculative given the typical habitat requirements of the relevant lamprey species and the barrier posed by lock gates. However the Environment Agency have advised the Applicant that they “agree it is unlikely that lamprey will enter the canal from the River Trent, but they may be present due to the transfer of water from the River Don. The River Don is hydrologically connected to the Humber Estuary Special Area of Conservation (SAC), and therefore, it is possible that river lamprey will make their way into the Stainforth and Keadby Canal.”~~

through screens and the transfer of these into the main cooling water transfer system). As explained below, these impacts are not likely.

- 6.3.63. The suggestion that lampreys could occur within the Stainforth and Keadby Canal arose during consultations on the Keadby CCS Power Station. It is emphasised that the potential usage of the canal by lampreys is not supported by evidence and is not likely given the typical habitat requirements of the relevant lamprey species and the barriers posed by existing lock gates. This is explained in more detail below:
- 6.3.64. No lamprey eDNA was detected at the Proposed Canal Water Abstraction during the fish survey completed in 2024 as reported in **ES Volume II Appendix 11F (Application Document Ref. 6.3)**. This survey provides robust data in support of the position that lampreys are not likely to be present within the canal within the zone of influence of the Proposed Development.
- 6.3.65. Further, upstream migration by adult lampreys from the River Trent is not likely and the Environment Agency agrees (consultation response dated 12 August 2025) on this point given the presence of a lock gate at Keadby Lock, and further lock gates upstream at Thorne Lock and Bramwith Lock.
- 6.3.66. The Environment Agency has previously advised that lampreys could still occur “*due to the transfer of water from the River Don. The River Don is hydrologically connected to the Humber Estuary Special Area of Conservation (SAC), and therefore, it is possible that river lamprey will make their way into the Stainforth and Keadby Canal.*” However, this is not supported by the eDNA survey data cited above which indicates likely absence.
- 6.3.67. Even should individual lampreys occasionally enter the canal via the above route it is questionable whether once within the canal they can still be considered to contribute to the breeding population of the Humber Estuary. Instead, it seems possible that they would be functionally lost from the breeding population because of the water transfer. To reach Keadby and then return to the Humber Estuary any lampreys in the canal would need to navigate the lock gates identified above, which would be as much of a barrier for downstream movement as they are for upstream migration. Certainly, considerably energy would need to be expended by adult lampreys to navigate the length of the canal (over 10km) and the various barriers given the sub-optimal flow regime and at a time in their life cycle when they are not feeding.
- 6.3.68. The flow regime within the canal is also unsuitable for juvenile life stages (‘transformers’). Lamprey transformers migrate primarily through drifting downstream and the Stainforth and Keadby Canal does not have sufficient flow to support this dispersal mechanism. Consequently, lamprey

transformers are not likely to be able to migrate back to the sea along the Stainforth and Keadby Canal given the distance involved is greater than 10km and the canal does not have sufficient flow to support this dispersal mechanism.

6.3.69. In relation to the entrainment and impingement risks posed to individual lampreys should they be able to both enter the canal and reach the section of the canal affected by the canal water abstraction, the following additional points are made.

~~6.3.60-6.3.70.~~ In relation to entrainment, it should be noted that compliance with current legislative regimes for European eel (*Anguilla anguilla*) (The Eels (England & Wales) Regulations 2009) (UK Government, 2009) requires screening of water intakes (so called 'eel screens') and typically a maximum screen mesh size of 2mm is required by the regulator (the Environment Agency). The design for the Proposed Development assumes this mesh size for legal compliance purposes. Consequently, because the Proposed Development must be designed to protect European eel, entrainment of lamprey species could not occur. This potential impact pathway can therefore be discounted. The minimum likely size of the smallest life stage (transformer) of the smaller of the two lamprey species (river lamprey) at point of entry into estuary systems averages about 10cm in length (Environment Agency, 2005), so could not pass through an eel screen of 2mm mesh size.

~~6.3.61-6.3.71.~~ Impingement is also not a relevant consideration in relation to the passage and conservation status of adult lampreys as they are strong swimmers that can orientate themselves away from the margins of the river channel (Lucas & Bracken, 2010). Therefore, bankside water intakes are not likely to interact with adult lampreys and where present they would be able to escape the pull of water into the intake. Impingement is therefore very unlikely, and adult lamprey are too large to pass through standard fish/ eel screens. Additionally, their anguilliform body shape and burrowing behaviour means that they are well protected from collision and abrasion if rare impingement events occur (Teague and Clough, 2014).

~~6.3.62-6.3.72.~~ In contrast, lamprey transformers migrate primarily through drifting downstream and consequently are at much higher risk of impingement because they are not strong swimmers, with a maximum escape velocity of 0.3m/s (Environment Agency, 2005). Lamprey transformers are not likely to migrate back to the sea along the Stainforth and Keadby Canal given this watercourse does not have sufficient flow to support this dispersal mechanism. However, the Environment Agency has suggested that they could be introduced to the canal in existing water transfers from the River Don. However, the absence of suitable flow regimes within the

canal also means that lamprey transformers are not likely to be present and at risk from impingement.

~~6.3.63-6.3.73.~~ Whilst acknowledging Further, the ~~potential risk of~~ impingement, ~~this~~ pathway does not exist as it is constrained by regulatory and abstraction licensing regimes. The Environment Agency, advises in its 12 August 2025 consultation response to the Applicant that “*given the very slow movement of water in the Stainforth and Keadby Canal, under the Eels (England and Wales) Regulations 2009, we would expect approach velocities at the intake screen to not exceed 0.1m/s. This is Best Achievable Eel Protection and would be a precautionary approach to protecting transformer lampreys.*” Therefore, the Abstraction Licence will require the abstraction to operate at a velocity that meets legal requirements in relation to European eel and consequently it would be below the maximum escape velocity for all life stages of the relevant lamprey species.

~~6.3.64.~~ ~~Alternatively if it is found not to be technically possible to achieve the above approach velocity needed to protect European eel, and subject to approval by the regulator, a fish rescue and return system may be included within the final design for the intake (as described within ES Volume I Chapter 4: Proposed Development (Application Document Ref. 6.2.0)) and this would be a system consistent with that previously approved by the Environment Agency for Keadby 2 Power Station as appropriate for fish protection. Consequently, no impact on the conservation status of fish species, including lampreys, would be reasonably expected as no such impact was concluded for the Keadby 2 Power Station.~~

~~6.3.65-6.3.74.~~ Given the Environment Agency advised requirements and the Applicant’s commitment to provide Best Achievable Eel Protection, which is enforced by legislation and licensing regimes in relation to European eel, it is therefore concluded that impacts on European Sites from operational impingement or entrainment of lamprey at the potential water intake location on the River Trent will not result in LSE ~~and can be screened out of~~ **screened out of** ~~Appropriate Assessment as it would not affect the conservation objectives.~~

6.3.75. The operational mortality and barrier pathway can be screened out of Appropriate Assessment as it would not affect the conservation objectives.

Natural England has confirmed agreement with this conclusion in their letter dated 27 November 2025.

6.4. Decommissioning

Habitat Disturbance and Modification – Decommissioning

- 6.4.1. At the end of its operating life, it is anticipated that all above-ground equipment and parts of the Proposed Development will be decommissioned and removed from the Proposed Development Site. Prior to removing the relevant plant and equipment, all residues and operating chemicals will be cleaned out from the plant and disposed of in an appropriate manner to comply with the mandatory environmental protection requirements enforced by Environmental Permit and environmental protection legislation. Any demolition contractor would have a legal obligation to consider decommissioning and demolition under the CDM Regulations 2015, or the equivalent prevailing legislation at that time.
- 6.4.2. All sub-surface infrastructure is proposed to be retained in situ. After appropriate treatment of all residues and operating chemicals (see above), the relevant buried pipework will be permanently filled with grout to prevent the possibility of future flooding or collapse. Grout injection would be undertaken onshore after the completion of the capping of pipes. These works would be subject to the legal requirements under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (UK Government, 2015) and the Environmental Permitting (England and Wales) Regulations 2016 (UK Government, 2016), which make water pollution illegal.
- 6.4.3. A Decommissioning Plan (including Decommissioning Environmental Management Plan (DEMP)) will be produced within the period specified in the relevant legislation in force at the time of cessation of operations and agreed with the Environment Agency as part of the Environmental Permit and site surrender process. The DEMP will consider in detail all potential environmental risks and identify how risks can be removed, mitigated or managed. This will include details of how surface water drainage should be managed during decommissioning and demolition.
- 6.4.4. Any materials forming part of the final design that would pose a risk to the environment as a consequence of their degradation, if left in situ, would be identified at decommissioning and would be specifically addressed in the Decommissioning Plan. It is reiterated that environmental pollution is illegal, so the Decommissioning Plan will need to be consider and address

all potential pollution pathways to achieve legislative compliance, which is mandatory.

- 6.4.5. It is possible that during decommissioning some waste materials will be loaded onto vessels for export via water. In relation to the loading of vessels, as happened during deliveries for Keadby 2 Power Station, vessels could be required to rest during a tide cycle on the bed of the estuary (Crown Land). No new works are proposed to permit vessels to use the existing wharf. This usage is consistent with existing permitted port related activity at Keadby. As an active port, a small number of vessels do rest on the bed when moored and the proposed use (and any related disturbance effects) is considered routine and entirely consistent with current practices at the wharf as a commercial port facility. Given the established use of the port facilities, no new habitat impacts are likely to arise as a consequence of the loading of vessels for the Proposed Development.
- 6.4.6. After consideration of the foregoing and placing weight on the requirements of permitting and legislation, no LSEs are anticipated during decommissioning. The decommissioning habitat disturbance pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.
- [Noise, Vibration and Visual Disturbance – Decommissioning](#)
- 6.4.7. The potential impacts during decommissioning would be less than those associated with construction as the primary noise source for construction relates to piling activities. In comparison decommissioning will involve a process of dismantling and deconstruction of buildings and structures at the Main Site and Ancillary Facilities.
- 6.4.8. The Main Site and the Ancillary Facilities, which will be the focus for decommissioning activities are located over 900m to the west of the nearest European Sites (the Humber Estuary SAC and Ramsar site), and consequently no meaningful increase in noise or visual disturbance of qualifying bird species is anticipated when they are occupying the European Sites given the conclusions of the construction assessment.
- 6.4.9. However, as construction was taken forward to Appropriate Assessment in relation to qualifying bird species that might utilise arable farmland and the Stainforth and Keadby Canal and also in relation to lampreys, the decommissioning noise and vibration disturbance pathway also remains **screened in** for Appropriate Assessment in relation to these species (vibration is not consider further as justified within the construction

assessment). Construction and decommissioning are assessed together within the Appropriate Assessment.

Invasive Non-Nature Species – Decommissioning

- 6.4.10. The assessment provided for construction is also applicable to decommissioning. The decommissioning INNS pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.

Atmospheric Pollution – Decommissioning

- 6.4.11. The assessment provided for construction is also applicable to decommissioning. Therefore dust remains **screened in** for Appropriate Assessment. Construction and decommissioning are assessed together within the Appropriate Assessment.

- 6.4.11-6.4.12. The decommissioning atmospheric traffic pollution pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.

Water Pollution – Decommissioning

- 6.4.12-6.4.13. The assessment provided for construction is also applicable to decommissioning. The decommissioning water pollution pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.

Temporary Impacts on Foraging Resources - Decommissioning

- 6.4.13-6.4.14. As construction was taken forward to Appropriate Assessment in relation to qualifying bird species that might rely on fish resources associated with the Stainforth and Keadby Canal, this pathway also remains **screened in** for Appropriate Assessment. Construction and decommissioning are assessed together within the Appropriate Assessment.

Mortality and Barriers to Lamprey Movement – Decommissioning

- 6.4.14-6.4.15. A cofferdam may be required within the Stainforth and Keadby Canal for the purposes of decommissioning the Canal Water Abstraction. Installation of the cofferdam is subject to Environmental Permit and this will require measures to prevent environmental harm (Environment Agency, 2019). The assessment provided for construction is also applicable to decommissioning. The decommissioning barrier and mortality pathway is **screened out** from Appropriate Assessment as it would not affect the conservation objectives.

7. Appropriate Assessment

7.1. Impact Pathways Screened in for Appropriate Assessment

7.1.1. The relevant impact pathways that could not be screened out at Stage 1 are:

- noise and visual disturbance of qualifying bird species during the construction and decommissioning periods;
- noise disturbance of qualifying bird species during the operational period;
- noise, vibration and lighting disturbance of lampreys during ~~installation of a cofferdam~~ during the construction and decommissioning periods;
- atmospheric pollution (dust) during the construction and decommissioning periods;
- atmospheric pollution (NOx, ammonia and nitrogen) during the operational period;
- water pollution during the operational period;
- impacts on the foraging resources of qualifying birds due to noise and vibration during the construction and decommissioning periods; and
- impacts on the foraging resources of qualifying birds due to atmospheric and water pollution during the operational period.

7.1.2. These pathways are considered in more detail below.

7.2. Noise Disturbance of Qualifying Bird Species During the Construction and Decommissioning Periods

7.2.1. As introduced in Section 6, noise disturbance ~~as a result~~because of construction and decommissioning works at the Main Site could affect qualifying bird species if adjacent areas of agricultural land or the Stainforth and Keadby Canal are of functional importance to these birds for foraging. Construction would be the most impactful period due to the requirement for piling during construction.

7.2.2. In most cases, it is not reasonable to consider adjacent farmland to be functionally linked land given the habitat needs of the qualifying bird species concerned (as summarised in Section 6 and **Appendix D**). The only named qualifying species likely to use this habitat is golden plover. Lapwing and mallard and other ducks, geese and swans can be considered to contribute to the wider assemblage and may also make more than incidental use of arable fields. For some developments within the Humber region, pink-footed goose (a species of the wider assemblage) has also been considered relevant. However, the pattern of

distribution of this species is well understood based on a long time series of data (Brides *et al.* 2013) as it relates to the roost sites at Read's Island and Whitton Sands and is therefore focussed to the east of the River Trent beyond the worst case potential zone of influence for noise and visual impacts.

- 7.2.3. Various desk study data sources collectively indicate the absence of notable aggregations of qualifying bird species within the 10km grid square within which the Site is located, with the implication that the landscape around the Proposed Development does not have an elevated value or specific importance for qualifying bird species.
- 7.2.4. A BTO Bird Data Report (**Appendix D**) was purchased and provides an analysis of combined data for the period 2007-2024. The purpose of a BTO Data Report is to provide rigorous scientific information to inform fieldwork decisions and desk studies for Ecological Impact Assessment of potential development sites in the UK. The reports "*collate comprehensive and contemporary bird distribution and abundance data from BTO's high quality ornithological datasets to identify species associated with the site at different spatial scales, and to put these in wider contexts to identify key features.*" The report, as explained in detail in Appendix D and considering also the habitat associations of the qualifying species, identifies no reasonable likelihood of most qualifying bird species occurring or being dependent on arable farmland habitats within the zone of influence of construction activities at the Main Site. The exceptions to this based on the data summarised for the 2007-2024 period are golden plover and lapwing.
- 7.2.5. This is further supported by data gathered for proposed developments located within the farmland landscape adjacent to the Site in the period 2021 to 2024.
- 7.2.6. Twice monthly wintering bird surveys completed between October 2021 and March 2022 inclusive for two proposed solar farms that would be located on agricultural land immediately west ('Ealand Solar') and north ('Keadby' Solar') of the Main Site and the former Keadby Ash Tip. Both sites coincide with the existing Keadby Wind Farm. These surveys were timed with reference to the tidal state with an emphasis on high tide observation to establish if the sites were used for winter high tide roosting or foraging. The wintering bird survey reports (FPCR Environment and Design Ltd (FPCR), 2022a,b) for these proposed solar farms were submitted with requests for a Scoping Opinion from North Lincolnshire Council (application references PA/SCR/2021/7 and PA/SCR/2021/8) and are in the public domain.
- 7.2.7. The FPCR surveys found no evidence that the agricultural land within the proposed wind farms has functional importance for qualifying bird species of the Humber Estuary SPA and Ramsar site. The presence of such

species was at most transitory and the numbers present were low, evidencing incidental usage only.

- 7.2.8. The following bird species are or could be considered qualifying bird species and were recorded using the fields within the Ealand Solar site during the winter:
- whooper swan – one bird on one of 12 surveys;
 - mallard – small numbers (8-14) on off-site ponds, five of 12 surveys; and
 - little egret – one bird on one of 12 surveys.
- 7.2.9. The following qualifying bird species are or could be considered qualifying bird species and were recorded using the fields within the Keadby Solar site during the winter:
- greylag goose – two to three birds on two of 12 surveys;
 - mallard – two birds on one of 12 surveys; and
 - golden plover – present on two of 12 surveys with counts of 45 and 159 respectively. The peak count represents 0.5% of the SPA population.
- 7.2.10. The above is further supported by public domain data published within the Ornithology Baseline Report accompanying the PEI Report for the North Humber to High Marnham NSIP (Planning Inspectorate, 2025). This scheme would pass through the landscape to the west and north of the Site (route section 6, M180 north to Luddington). Walkover surveys and three vantage point sectors (vantage points 9, 10 and 11) collected data for this area. For vantage point 9, 63 hours of data were collected for the period December 2023 to September 2024, 67 hours of data were collected for the period December 2023 to September 2024 for vantage point 10, and 48 hours over the period January to September 2024 for vantage point 11.
- 7.2.11. Despite this large survey effort, the combined Humber to High Marnham results from arable farmland within route section 6 were summarised as follows (with supplementary contextual information also from the report, but not part of the quoted text, provided within the square brackets): *“a single hen harrier was recorded foraging over arable habitat. Two small groups [8 birds in each] of golden plover were also recorded roosting in arable habitat in this route section. Other species in this route section included small numbers of grey heron [1 bird seen once], greylag goose [8 observations, each of 1 to 20 birds], mallard [13 observations, each of 1 to 2 birds] and mute swan [11 observations, each of 3 to 28 birds].”* Qualifying bird species were only recorded during the winter period within route section 6..” Qualifying bird species were only recorded during the

winter period within route section 6.6.” Qualifying bird species were only recorded during the winter period within route section 6.

- 7.2.12. Based on the full dataset collected for the North Humber to High Marnham scheme, most qualifying bird species were recorded within the landscape closest to the Humber Estuary (route sections 3-5 which are located north from Luddington). Golden plover was almost exclusively found within sections 3-5 and lapwing was also most frequent in these sections. Therefore the results are consistent with the findings of the above solar farm surveys and indicate only a low level of presence by qualifying bird species.
- 7.2.13. Of the species recorded using the above sites, only golden plover is a named qualifying species. The other species could be considered to form part of the wider non-breeding waterbird assemblage (only mallard is specifically named as a component species on the SPA citation), although this is not certain and is not possible to demonstrate beyond reasonable doubt. These are widespread species, with mallard, little egret and greylag goose being present year round in a wide variety of habitats within the landscape.
- 7.2.14. Construction noise modelling has been undertaken for the Application (which replaces the initial modelling reported in **Appendix D**), the results of which are illustrated by the noise contour map provided as **Figure 3**. It is emphasised that due to the complexities of construction noise modelling Figure 3 implies an overly simplistic and worst-case scenario that would not occur in practice i.e. piling, the single largest noise producing activity, would not occur continuously and all piling related noise sources (including machinery such as generators and compressors) would not always operate simultaneously. Piling would be a periodic activity and it would be restricted to the committed construction working hours.
- 7.2.15. **Figure 3** clearly shows that most of the landscape surrounding the Site would experience worst-case construction noise levels of below 50db i.e. below the threshold for insignificance. This includes most of the farmland to the south and west of the Site, the southwest corner of the former Keadby Ash Tip where some minor wetland bird habitat (small scrapes) was previously created as a requirement of the planning permission for the Keadby 2 Power Station, and all of the pasture fields located between Keadby 1 Power Station and Keadby village.
- 7.2.16. The arable farmland within which a potential noise impact could arise (experiencing 50-65dB) is restricted to approximately 54ha, mainly to the north of the Main Site where it coincides with Keadby Wind Farm. This is a negligible area (as can be readily verified from online imagery) of arable farmland habitat in comparison with the wider resource of arable farmland

in the landscape in North Lincolnshire around the Humber Estuary where arable farming is the predominant land use.

- 7.2.17. The area experiencing the most noise to the north of the Main Site encompasses a farm track, two wind turbines associated with Keadby Wind Farm and associated infrastructure, and it is within the likely zone of influence of the National Grid 400kV Substation. So, the existing disturbance sources indicate a setting that is not likely to be attractive as foraging habitat for qualifying bird species. The remaining area is also located within the area occupied by the Keadby Wind Farm and consequently is already subject to elevated levels of background noise (relative to undeveloped areas of farmland), and also visual disturbance, arising from the presence and movement of the wind turbines.
- 7.2.18. Using the classification given in paragraph 6.2.11, the noise level experienced in the agricultural land to the north of the Main Site would be up to 65dB (the area marked as up to 70dB comprises a wind farm track and turbine base so is not considered to merit further consideration). To the south and east of the Main Site the agricultural land would experience a lower noise impact of up to 55dB and is within the area where the zone of influence of the railway line (which is the dominant noise source in the area, with three passenger trains operating per hour off-peak plus additional freight movements). Irrespective of existing noise sources, in all areas the noise levels represent a negligible noise impact to birds.
- 7.2.19. Postlethwaite and Stephenson (2012) reported evidence from a detailed measurement exercise on the disturbance effects on birds at Pyewipe mudflats (located within the Humber Estuary SPA) from percussive piling for the Grimsby River Terminal. This study found that noise levels from piling of less than 66dB gave rise to no noise disturbance on birds using the mudflats, whilst noise levels in the range of 66 to 83dB resulted in low level disturbance only (heads raised alert and temporarily stopping feeding, or roosting). So qualifying birds are not likely to be excluded from foraging habitat or experience a meaningful impact from noise when in the construction zone of influence.
- 7.2.20. Given the foregoing, there is no reasonable likelihood of an impact on the nature conservation status of any qualifying bird species using arable farmland as the construction noise levels would not be sufficient to displace/exclude birds from arable farmland or limit access to sufficient arable habitat, habituation to regular construction noise is likely, and only a very minor behavioural response would be expected to occur and then only when noise occasionally peaks above the typical background construction noise levels that birds are likely to habituate to.
- 7.2.21. Construction noise above 50db would be received at the Stainforth and Keadby Canal only in the immediate vicinity of the Canal Water Abstraction (**Figure 3**). The affected length of canal would be in the order

of 1.1km. In most of this area, the upper noise level would be 55db. Noise levels above this (56-70db) would only occur in a very short stretch east of the Keadby Sliding Railway Bridge i.e. approximately 200m of the canal. Within this area, the predominant established sources of disturbance to birds (both noise and visual) are numerous and include the boat traffic using the canal, regular recreational activity (e.g. dog walking, walking, cycling and running, and angling) along the canal towpath due to the proximity to Keadby village, the operational Keadby 1 and 2 Power Stations, and the railway line. Given, these established activities and land uses there it is unlikely that this specific section of canal will have an elevated level of importance to birds.

- 7.2.22. The habitat within the canal is also not optimal for most of the qualifying bird species due to the habitat conditions not providing exposed sediments suitable for species that forage on invertebrates. Although species that catch fish could occur. Irrespective of this, the worst-case (when piling is taking place for installation of a cofferdam) zone of influence represents just 11% of the 10km of canal within the worst-case impact risk zone set by Natural England in relation to the Humber Estuary Ramsar site (and the Humber Estuary designation itself would not experience adverse construction noise levels). Noise levels above 55dB would affect only 2% of the canal. It is also re-emphasised that the predominant source of construction noise during construction at the Canal Water Abstraction relates to piling operations for installation of the cofferdam, an activity that would involve no more than 25 days of work to install a cofferdam of the small size required.
- 7.2.23. As stated above, noise levels of 65dB or lower can be considered negligible and are not likely to adversely affect birds. The very small area of the Stainforth and Keadby Canal that could be affected by noise above this level, which is essentially the location of the proposed cofferdam, and the very limited duration of the relevant activities (intermittent piling for a period of 25 days) indicates a trivial potential impact on habitat availability to birds. Therefore an impact on nature conservation status would not reasonably be expected if there is a temporary displacement impact during construction of the Canal Water Abstraction.
- 7.2.24. Given the foregoing, even should a small number of qualifying birds occur periodically and experience low level disturbance this is not likely to be at a level or duration sufficient to affect the conservation status of the species concerned or the assemblage. Consequently, it is concluded that there will be no adverse effect on the integrity of the relevant European Sites as a

result of visual and noise disturbance of qualifying bird species during construction and decommissioning of the Proposed Development.

7.1. Noise Disturbance of Qualifying Bird Species During the Operational Period

- 7.1.1. The Appropriate Assessment of construction noise impacts on birds can be extended to the Appropriate Assessment of operational noise impacts on birds. Consequently, the assessment focuses on the main points only. Noise modelling has been undertaken for the Application, the results of which are illustrated by the noise contour map provided as **Figure 4**.
- 7.1.2. **Figure 4** clearly shows that most of the farmed landscape surrounding the Site would experience worst-case construction noise levels of below 50db i.e. below the threshold for insignificance. This includes all farmland to the south and west of the Site, the southwest corner of the former Keadby Ash Tip where some minor wetland bird habitat (small scrapes) was previously created as a requirement of the planning permission for the Keadby 2 Power Station, and all of the pasture fields located between Keadby 1 Power Station and Keadby village.
- 7.1.3. The area to the north of the Main Site within which a potential noise impact above 50dB could arise is restricted to part of a single intensively managed arable field within Keadby Wind Farm and encompasses approximately 15ha. This is a negligible area of arable farmland habitat in comparison with the wider resource of arable farmland in the landscape. The modelling predicts worst-case operation noise levels of up to 60dB.
- 7.1.4. Using the classification given in paragraph 6.2.11, the noise level experience in all-of the area affected would be under 65dB and therefore represent a negligible noise impact to birds. Therefore, no impacts on the nature conservation status of any qualifying bird species would reasonably be anticipated, and birds are likely to habituate (if not already habituated) given the Proposed Development will be operating constantly within a baseline already influenced by regular to constant noise from the existing adjacent industrial infrastructure.
- 7.1.5. Construction noise above 50db would be received at the Stainforth and Keadby Canal only in the immediate vicinity of the Canal Water Abstraction (**Figure 4**). The affected length of canal would be in the order of 120m. The noise level is not likely to exceed 65dB.
- 7.1.6. Within this area, the predominant established sources of disturbance to birds (both noise and visual) are numerous and include the boat traffic using the canal, regular recreational activity (e.g. dog walking, walking, cycling and running, and angling) along the canal towpath due to the proximity to Keadby village, the operational Keadby 1 and 2 Power

Stations, and the railway line (the latter being the dominant noise source in the area, with three passenger trains operating per hour off-peak plus additional freight movements). Given, these existing established activities and land uses there is no likelihood that this specific section of canal is of functional importance to birds.

7.1.7. The very small area affected by noise above this level indicates a trivial potential impact on habitat availability to birds and birds are likely to habituate to the presence of the Canal Water Abstraction (as they presumably have already done in relation to the Keadby 2 Power Station abstraction). Therefore an impact on nature conservation status would not reasonably be expected if there is a temporary displacement impact during construction of the Canal Water Abstraction.

7.1.8. Given the foregoing, even should a small number of qualifying birds occur periodically and experience low level disturbance this is not likely to be at a level or duration sufficient to affect the conservation status of the species concerned or the assemblage. Consequently, it is concluded that there will be no adverse effect on the integrity of the relevant European Sites as a result because of visual and noise disturbance of qualifying bird species during operation of the Proposed Development.

7.2. **Noise, Vibration and Visual Disturbance of Lampreys During Installation of a Cofferdam during the Construction and Decommissioning Periods**

7.2.1. Two pathways for LSEs were screened in i.e. noise and vibration impacts during construction of the coffer dam in the Stainforth and Keadby Canal, and lighting impacts on lampreys migrating along the River Trent.

7.2.1-7.2.2. The Humber Estuary SAC and Ramsar site are designated for river and sea lamprey. Construction of a cofferdam within the Stainforth and Keadby Canal would result in underwater construction noise and vibration impacts from piling activities. This in turn could potentially have a temporary deterrent effect on the ability of lamprey to access breeding habitats in the wider catchment, and to return to the Humber Estuary from these habitats.

7.2.2-7.2.3. Whilst Natural England previously requested (in relation to Keadby CCS Power Station) that the canal not be discounted as a possible migration corridor (functionally linked habitat) for lampreys, upstream migration by adult lampreys from the River Trent is not likely and the Environment Agency agree (consultation response dated 12 August 2025) on this point given the presence of a lock gate at Keadby Lock, and further lock gates upstream at Thorne Lock and Bramwith Lock.

7.2.3-7.2.4. However, the Environment Agency have suggested that lampreys could enter the canal via existing water transfers from the River Don, although

The Keadby Next Generation Power Station Project

this is unevidenced and speculative. It is also questionable whether once within the canal the affected lampreys can still be considered to contribute to the breeding population of the Humber Estuary. Instead, it seems possible that they would be functionally lost from the breeding population **as a result because** of the water transfer. **In order to** reach Keadby and then return to the Humber Estuary any lampreys in the canal would need to navigate the lock gates identified above, which would seem as much of a barrier for downstream movement as it is for upstream migration. The flow regime within the canal is also unsuitable for juvenile life stages ('transformers'). Lamprey transformers migrate primarily through drifting downstream and the Stainforth and Keadby Canal does not have sufficient flow to support this dispersal mechanism. Certainly, considerably energy would need to be expended by adult and transformer lampreys to navigate the length of the canal and the various barriers given the sub-optimal flow regime and at a time in their life cycle when they are not feeding.

7.2.4-7.2.5. No lamprey eDNA was detected at the Proposed Canal Water Abstraction during the fish survey completed in 2024 as reported in **ES Volume II Appendix 11F (Application Document Ref. 6.3)**.

7.2.5-7.2.6. A standalone detailed assessment of potential underwater noise and vibration impacts on fish was prepared for Keadby CCS Power Station DCO (which included a potentially more adverse option for installation of a cofferdam in the River Trent, something that is not part of the Proposed Development) and is provided as part of **ES Volume II Appendix 11F (Application Document Ref. 6.3)**. This concluded that lampreys are not likely to be adversely affected by underwater noise and vibration during installation of a cofferdam and other activities. The reasons for this are set out below.

7.2.6-7.2.7. Firstly, the physiology of lamprey makes them inherently resilient to the kinds of physical injury (e.g. barotrauma) that other fish species can experience as result of adverse levels of underwater noise and vibration. The impact of underwater sound on fish is, to a large extent, determined by the physiology of fish, particularly the presence or absence of a swim bladder and the potential use of the swim bladder to improve the hearing sensitivity and range of hearing. When fish with swim bladders are in very close proximity to a sound source of very high sound pressure level, such as impact pile driving of very large steel piles, swim bladder rupture can occur and result in mortality. In contrast, lampreys lack a swim bladder or other gas chamber, and hearing involves detecting particle motion rather than sound pressure. So, no mortality from noise or vibration from cofferdam installation is likely to occur.

7.2.7-7.2.8. Secondly, it is usually considered that adverse changes in behaviour (e.g. behavioural changes that affect migration) **as a result because** of underwater noise and vibration on lamprey are also not likely to occur. Lampreys would need to be very close to a powerful noise source for a

behavioural response to occur (Popper, 2005; Popper and Hastings, 2009). Lenhardt and Sismour (1995) carried out experiments on sea lamprey and detected a startle response to frequencies between 20 and 100Hz. However, the response was considered likely to be more due to vibration than waterborne noise. Startles while swimming were rare, suggesting that direct contact with the vibrating surface was needed to trigger the reaction. As further indirect evidence of this, the river lamprey was included in a study on the effect of a playback system (with emission frequencies between 20 and 600Hz) in reducing estuarine fish intake rates at a power plant cooling water inlet (Maes *et al.* 1999, 2004). No significant reductions in river lamprey catches were observed indicating the lack of a deterrence impact on lamprey movements.

7.2.8-7.2.9. Regardless of the above conclusions, in order to protect other fish species that are not qualifying features of the Humber Estuary SAC and Ramsar site, the Proposed Development will adopt the standard mitigation for protection of marine receptors from the effect of underwater sound (JNCC, 2010), specifically a soft-start for all hammer driven piling activity. Whilst these measures are designed for the protection of marine mammals, they also provide protection for fish. These measures ensure that sound intensity from piling, and any associated particle motion, will increase only gradually before reaching full power. In the unlikely event that individual lamprey are incidentally present and exposed to noise/ vibration, soft start would allow opportunity for these individual lampreys to move away from the immediate vicinity of the construction area should they perceive a potential threat from these activities. This mitigation is allowed for within the **Outline CEMP (Application Document Ref. 7.4)** and will be secured via the final CEMP.

7.2.9-7.2.10. Given the low likelihood of lampreys using the Stainforth and Keadby Canal (given access to the canal would require transfer with water from the River Don), the inherent lack of sensitivity of lamprey species and the additional assurance provided by the mitigation for other more sensitive fish species it is concluded that there will be no adverse effect on lampreys and the integrity of the Humber Estuary SAC and Ramsar site as a result of noise and vibration during cofferdam installation during construction and decommissioning of the Proposed Development.

7.2.11. Natural England has advised that they consider that visual disturbance could adversely impact lamprey migration if lighting is used between dusk and dawn over the period 1st May to 30th November.

7.2.12. Whilst there is evidence that juvenile lampreys can orientate and adjust their movements in response to artificial light sources any response is likely to be context specific and potentially outweighed by other influences, particularly flow regimes. Water depth and turbidity are also likely to be

important factors limiting light penetration into waters used by lampreys within the estuarine reach of the River Trent.

- 7.2.13. Haro *et al.* (2025) have shown that downstream movement of juvenile lampreys during October and November appears to be stimulated by precipitation-induced high flow events. Given this and the use of flows to assist migration, and the relatively weak swim speeds of juvenile lampreys, such flow events are considered likely to drive migration of juveniles past the wharf irrespective of any localised influence of lighting. Similarly, the tidal regimes within this section of the River Trent would also expect to be another predominant force dictating juvenile lamprey movements irrespective of any lighting influence. Should the tide be operating against the flow of lamprey movement then this would be the primary barrier to the movement of juvenile lampreys irrespective of the presence of any lighting.
- 7.2.14. The evidence for an adverse impact on migrating adult lampreys is weak and at best an inconsistent response has been recorded (Stamplecoskie *et al.*, 2012).
- 7.2.15. The above suggests that the potential for lighting to be adverse is constrained by other factors operating and of greater importance within a large tidal river (tidal regimes, spate flows, and natural turbidity restricting light penetration). This is reduced further once the specifics of the proposed development are considered i.e. the likely duration of any lighting use. The lighting impact pathway is not likely to operate because:
- most construction activities do not coincide with lamprey migration habitats as they are located at distance from the River Trent and because Natural England has agreed that the locks of the Stainforth and Keadby Canal preclude the use of the canal for migration (letter dated 27th November 2025). Therefore, any lighting of construction, which is restricted to the Main Site and the Canal Water Abstraction, will not affect lampreys; and
 - for most of the risk period the committed construction hours, when most deliveries will arrive at the wharf, are restricted to daylight hours i.e. 07:00 to 19:00. These construction hours only fall outside the hours of daylight in the evening period between 24th October to 30th November.
- 7.2.16. In the unlikely event that occasional ‘as and when’ lighting is required when off-loading at the wharf then this would only be in operation for the duration of the required activities so is not likely to encompass a full night time period. The extent of task specific lighting is also not likely to encompass the full or even a substantive part of the width of the River Trent at the Port given this is 140m wide, and the broader commitment to avoid nuisance impacts from lighting. As with other construction lighting,

the temporary lighting for offloading at the wharf during construction will be designed so that excessive glare is minimised outside of the working area, including towards the River Trent, as far as reasonably practicable. This is allowed for within the **Outline CEMP (Application Document Ref. 7.4)** and will be secured via the final CEMP as a Requirement of the **Draft DCO (Application Document Ref. 3.1)**.

7.2.17. Given the low likelihood of lampreys using the River Trent being affected by lighting from the wharf and the controls over lighting allowed for within the Outline CEMP it is concluded that there will be no adverse effect on lampreys and the integrity of the Humber Estuary SAC and Ramsar site as a result of lighting at the wharf during construction and (if relevant) decommissioning of the Proposed Development.

7.3. Atmospheric Pollution During the Construction and Decommissioning Periods

7.3.1. The air quality assessment (**ES Volume II Appendix 8A (Application Document Ref. 6.3)**) considers that there is potential for dust to reach the Humber Estuary SAC and Ramsar site during construction.

7.3.2. The qualifying habitat features within the 50m zone of influence relevant to the assessment of dust are (all other qualifying habitats being located further away):

- estuaries – encompassing the main river channel;
- mudflats and sandflats not covered by seawater at low tide – encompassing the marginal mud banks exposed at low tide; and
- common reed vegetation fringing the River Trent.

7.3.3. The air quality impact assessment does not analyse in detail the activities that could generate dust, but this is highly relevant to the purpose of this HRA Appropriate Assessment Report. The closest construction activities for the Proposed Development are for the Canal Water Abstraction which is located over 600m from the Humber Estuary SAC and Ramsar site. As such, there is a high degree of confidence that dust would not be elevated above the typical background levels and reach the Humber Estuary as the construction activities are too distant for this to occur.

7.3.4. Further, this pathway could only apply if dust was mobilised into the wider environment, which is not likely given public health requirements for the control of dust. Dust suppression and monitoring to protect public health is secured within the **Outline CEMP (Application Document Ref. 7.4)** for example wheel washes and dust suppression would be applied before

construction vehicles exit construction areas to protect public health from dust.

7.3.5. Accordingly, it is concluded that there will be no adverse effect on the integrity of the Humber Estuary SAC and Ramsar site because of dust during construction of the Proposed Development.

7.3.7.4. **Atmospheric Pollution During the Operational Period**

7.3.1.7.4.1. The air quality assessment (**ES Volume II Appendix 8B (Application Document Ref. 6.3)**) results show that process contributions (PCs) of more than 1% of the annual average critical level for NO_x and ammonia occur at the adjacent Humber Estuary SAC and Ramsar site. This also has a potential bearing on the quality of functionally linked habitats for the qualifying bird species of the Humber Estuary SPA. At Appropriate Assessment it is possible to take account of site-specific background pollutant concentrations reported by APIS.

7.3.2.7.4.2. In addition, it may be necessary to add data for other developments deemed relevant at the time of assessment where data for these are not captured within APIS. Appendix 8B identifies that the only relevant latter development was the Keadby 2 Power Station given this only became commercially operational in March 2023 and therefore it is considered that this will not yet be included in the baseline monitoring data available for the study area. The baseline data was therefore modified to include Keadby 2. **ES Chapter 21 Cumulative and Combined Effects (Application Document Ref. 6.2)**, confirms that there are no other third-party plans or projects that could result in in-combination air pollution effects.

7.3.3.7.4.3. It is emphasised that the air quality assessment was undertaken in-combination with Keadby 2 Power Station from the outset, as this is an operational development that is not yet accounted for within APIS. The results presented in **Appendix E**, as relied on below, are therefore the in-combination results for the Proposed Development with the modified baseline including Keadby 2.

7.3.4.7.4.4. The Environment Agency air emissions risk assessment guidance instructs that the impact of stack emissions can be regarded as insignificant and therefore there would be no LSEs at sites with statutory designations if the long-term Predicted Environmental Concentration (PEC) – which is the PC plus the baseline - is less than 70% of the critical level.

7.3.5.7.4.5. For both NO_x and ammonia, the air quality impact assessment concludes that the levels received at the Humber Estuary SAC and Ramsar site, as a result because of the Proposed Development in-combination with the

background levels, would be less than 70% of the critical level threshold for insignificance (**Appendix E**). Therefore no exceedances of the annual critical level are predicted for NOx and ammonia.

~~7.3.6-7.4.6.~~ Accordingly, it is concluded that there will be no adverse effect on the integrity of the Humber Estuary SAC and Ramsar site ~~as a result because of NOx and ammonia concentrations that~~ the qualifying habitats and species during operation of the Proposed Development.

~~7.3.7-7.4.7.~~ The worst-case air quality assessment (**ES Volume II Appendix 8B (Application Document Ref. 6.3)**) predicts nutrient nitrogen deposition of 0.32kg N/ha/year at the Humber Estuary SAC and Ramsar site for the gas firing scenario (worst case) (Receptor IDs OE1-5, **Appendix E**). This equates to ~~1.63.2%~~ of the critical load for the ~~pioneer upper~~ saltmarsh qualifying habitat, and in combination with the background concentrations (which includes Keadby 2), the PCs are ~~84.167%~~ and therefore ~~more than 70% of exceed~~ the threshold for insignificance. ~~However, the critical load is not exceeded and the cumulative nitrogen deposition would remain well below 100% of the critical load set for pioneer saltmarsh.~~

~~7.3.8.~~ Further, as noted previously in paragraph 6.2.30, saltmarsh is not present in the zone of influence for a potential nitrogen impact at OE1-5. The qualifying community of 'Salicornia and other annuals colonising mud and sand' is a pioneer saltmarsh vegetation colonises intertidal mud and sandflats in areas protected from strong wave action and is an important precursor to the development of more stable saltmarsh vegetation. It develops at the lower reaches of saltmarshes where the vegetation is frequently flooded by the tide, and can also colonise open creek sides, depressions or pans within saltmarshes, as well as disturbed areas of upper saltmarshes (JNCC, 2025). There is no niche for such vegetation on the River Trent at Keadby, where there is only a narrow band of intertidal mud that is fully covered by all tides and a sharp transition from this to dense perennial vegetation of common reed.

~~7.3.9.~~ The closest known occurrence of the pioneer saltmarsh qualifying feature occurs more than 9km to the northwest and coincides more closely with the Humber receptor OE32 as assessed within Appendix 8B, the results for which are provided in **Appendix E**. At this location there would be no exceedances of the critical load for any of the qualifying habitats and therefore no LSE were identified at this location within Section 6.4.

7.4.8. APIS indicates that the potential impact from nitrogen on upper saltmarshes relates to the promotion of dominance of grass species to the detriment of the wider flora. However, the precise type of upper saltmarsh for which the Humber Estuary is designated, i.e. the Atlantic salt meadows habitat, shows consideration variation particularly where there are transitions to other habitats and depending on the position within the estuary and the associated tidal regime. Some communities are more

species-poor and grassy in character than others, so the response to nitrogen will equally be variable. This is important context for the assessment of impacts. The only mapping in support of the presence of upper saltmarsh along the River Trent within the zone of influence is that produced by the Environment Agency mapping referenced early in this HRA Appropriate Assessment Report. This mapping derives from a remote sensing exercise rather than field survey work to define and characterise the specific vegetation types. The underpinning method statement clarifies that the 'upper marsh' zone mapped by the Environment Agency refers specifically to vegetation characterised by "*Festuca rubra*, *Elytrigia dominant marsh*, *Bolboschoenus*, *Juncus dominant marsh*" (Environment Agency, 2014; Hambidge & Phelan, 2014). In other words, vegetation dominated by grasses and grass-like species.

- 7.4.9. This is consistent with the observations made for the Proposed Development and Google Earth imagery. Where the banks of the river were examined at Keadby during baseline surveys for the Proposed Development, an abrupt transition was observed from open water/ intertidal mudflats within the river, to common reed vegetation dominating the river bank and then other typically grass dominated vegetation on the face or top of the floodbank.
- 7.4.10. It is also consistent with the Ramsar citation which provides a clear description of the upper reaches of the Humber Estuary. This states "*the upper portion of the saltmarsh community is atypical, dominated by sea couch Elytrigia atherica (Elymus pycnanthus) saltmarsh community. In the upper reaches of the estuary, the tidal marsh community is dominated by the common reed Phragmites australis fen and sea club rush Bolboschoenus maritimus swamp with the couch grass Elytrigia repens (Elymus repens) saltmarsh community.*"
- 7.4.11. Given the foregoing, the upper saltmarsh vegetation requiring assessment is one that is grass dominated. Such communities are likely to be of low sensitivity to additional nitrogen. For example, where sea couch dominates (i.e. the SM24 community of the National Vegetation Classification) there are few associated species. Similarly, the red fescue (*Festuca rubra*) and rush (*Juncus*) communities (SM16 and SM15 respectively) are also characterised by a dense swards of these dominant species and other grasses to the general exclusion of other species except where the grasses are suppressed by grazing. The banks of the River Trent are not grazed so there is no suitable management to prevent the dominance of grasses and rushes.
- 7.4.12. Further, as saltmarsh systems are subject to continual, daily, periodic flooding with saline water the very small contribution of nitrogen from the Proposed Development is likely to be outweighed by the removal of nutrients via scour and flushing by the tide. So there can be a high degree of confidence that nitrogen from emissions from the Proposed

Development would not adversely affect the structure or integrity of this upper saltmarsh community which is already characterised by dominant grasses and grass-like species.

- 7.4.13. In relation to the riparian vegetation of common reed fringing the River Trent at OE1-5, the worst-case air quality impact assessment predicts nutrient nitrogen deposition that equates to 2.1% of the precautionary critical load of 15kg N/ha/year set for the best fit proxy habitat of rich fen. The PEC is 111% and therefore more than 70% of the threshold for insignificance and the critical load is exceeded.
- 7.4.14. As noted previously within this HRA, assessment of common reed vegetation against the rich fen habitat type is overly precautionary. Rich fens are wetlands fed by mineral-enriched calcareous waters and where common reed is present it is usually mixed with a variety of other herbaceous species. Whereas the riparian vegetation being assessed fringes a large tidal river (under the UK Habitat Classification this would be 'aquatic marginal vegetation' not 'reedbed') and is inundated during high tides. Common reed is overwhelmingly dominant within this habitat, as is typical for rivers within the tidal influence (as documented on the citation for the Ramsar site designation), to the almost complete exclusion of herbaceous species (as described in paragraph 11C.4.36 of **ES Volume II Appendix 11C - Application Document Ref. 6.3**), and an absence of typical rich fen herbaceous species. **Plate 1** and **Plate 2** below illustrate this vegetation.
- 7.4.15. As such, there is a high degree of confidence that the relevant vegetation does not have importance for rare or specialised plant species, including bryophytes and lichens. Further, its primary value to birds is structural (nest sites) and it does not represent typical foraging habitat (as listed in footnote 9) for the qualifying bird species of the Humber Estuary SPA and Ramsar site.



Plate 1 – A typical view along the linear stand of riparian common reed vegetation fringing the River Trent in the vicinity of the proposed water discharge at Keadby



Plate 2 – A typical view through the riparian common reed vegetation fringing the River Trent in the vicinity of proposed water discharge at Keadby

7.4.16. The potential impact of nitrogen deposition on rich fen relates to its role as a fertiliser that promotes the growth of tall, robust vascular plant species including grasses such as common reed, at the expense of more sensitive species. Therefore, in this case the impact would not be realised as this is already, and quite naturally, a species-poor community dominated by common reed. Deposition of nitrogen is therefore not likely to affect the composition, structure or integrity of this habitat, or alter its suitability/functionality to birds. The very small contribution of nitrogen from the Proposed Development is also likely to be outweighed by the removal of nutrients via scour and flushing by the tide.

7.3.10-7.4.17. It is concluded that there will be no adverse effect on the integrity of the Humber Estuary SAC and Ramsar site as a result of designations because of nutrient nitrogen deposition to the qualifying habitats and species during operation of the Proposed Development.

7.4.7.5. **Water Pollution During the Operational Period**

7.4.1-7.5.1. Potential pathways for impacts from water pollution relate to:

- surface water drainage; and
- discharges of treated effluent to the River Trent.

7.4.2-7.5.2. If the above pathways for impact operate then it could adversely affect the habitats of the designations, food resources for river lamprey and qualifying bird species feeding within the estuary habitats of the River Trent, and thermal discharges with treated effluent could result in barriers to lamprey migration within the River Trent.

7.4.3-7.5.3. As described in Section 6.3, surface water runoff from the hard landscaping of the Proposed Development during operation may contain oil and other urban diffuse pollutants, and these pollutants may be harmful individually or combined with other pollutants. In the worst-case event of a fire, firewater also represents a potential pollutant. This risk has informed the final design of the Proposed Development ~~so as~~ to achieve compliance with the relevant legislation that makes water pollution illegal, and to comply with consenting and permitting requirements.

7.5.4. The Within the Environmental Permit application the Applicant has confirmed that the design of the proposed surface water drainage system is will:

- employ attenuation ponds and oil water separators, to include the use of sustainable drainage systems (SuDS) attenuate surface water flows due to provide treatment increases in the impermeable area because of the Proposed Installation;

- the drainage system will direct water to two retention ponds which will be sized to enable greenfield runoff from areas rates to be maintained to preserve the local drainage network capacity outside the Proposed Installation and not affect the Internal Drainage Board (IDB) controlled pumping to the River Trent;

~~7.4.4. where there is a low risk of contamination to ensure potential adverse effects on water quality and habitat of receiving water bodies are avoided.~~

- The drainage system will be designed to be inherently safe and protect the local environment from diffuse pollutants that may be present. Clean surface water runoff will for contaminated surface water run-off, bunding will be provided so that these streams can be segregated from managed separately and therefore only uncontaminated surface water will go directly to the retention pond for discharge; and

~~7.4.5. contaminated/ potentially contaminated water, which surface water run-off will be directed to on-site treatment plant or for off-site disposal, where applicable appropriate.~~

~~7.4.6-7.5.5.~~ The final permanent surface water drainage strategy, which ~~will be~~ is secured by a requirement Requirement 11 of the **Draft DCO (Application Document Ref. 3.1)**, will incorporate pollution prevention measures as informed by the detailed drainage design which will include and to accord with the Environmental Permit. The final details will allow for:

- bypass oil water separators will be provided for surface water runoff prior to discharge to Drain 1;
- oil interceptors will be fitted with alarms;
- allow for inclusion of isolation/ sluice valves in the drainage network to allow any unplanned chemical spills to be safely removed for treatment
- separation of process water from surface water drainage;
- penstocks will be provided to isolate any spills or contaminated water/ firewater in the surface water drainage system and prevent its discharge to the environment;
- use of bunds use of bunded storage areas sited above any potential flood water level when storing liquids whose emission to water or land could cause pollution; and
- an Emergency Response Plan would also be prepared and implemented as part of the Site Environmental Management System. Should any spillage occur, the Environment Agency would immediately be informed, or Severn Trent Water should it impact the foul water system.

- ~~7.4.7-7.5.6.~~ ~~An Environmental Permit and other consents will be needed for the final surface water drainage strategy. To achieve these, appropriate consultations~~ Consultations will be undertaken to agree the above design parameters and the surface water monitoring programme, to allowsupport third party verification that these are adequate for purposes of pollution prevention. The Environment Agency will be consulted on the final design and can be expected to impose conditions within the Environmental Permit that prevent environmental harm. IDB consent will also be needed given hydrological links to IDB maintained watercourses, and consultation will therefore be continued to agree any relevant mitigation measures required. The Lead Local Flood Authority will also be consulted to agree the final design.
- ~~7.4.8-7.5.7.~~ The Proposed Development also requires a supply of cooling water for heat rejection purposes. The proposed cooling method will utilise water abstracted from the Stainforth and Keadby Canal (Canal Water Abstraction). Treated effluent will be discharged to the River Trent and therefore the Humber Estuary SAC and Ramsar site under an Environmental Permit. The discharge will be via the existing outfall structure that was originally installed to serve Keadby 1 Power Station, and which also serves Keadby 2 Power Station. Prior to discharge, the treated effluent from the Proposed Development will be mixed with the existing effluent discharge from Keadby 2 Power Station and the cooling water discharge from Keadby 1 Power Station.
- ~~7.4.9-7.5.8.~~ It is anticipated, consistent with Keadby CCS Power Station DCO, that the rate of discharge from the Proposed Development will be no greater than the 1m³/s currently consented for Keadby CCS Power Station and will be discharged intermittently with the 0.1 m³/s consented for Keadby 2 Power Station and 15m³/s consented for Keadby 1.
- ~~7.4.10-7.5.9.~~ Effluent could, if not adequately treated and monitored prior to discharge, contain potential pollutants, including residual biocides and other blowdown products. However, the discharges would be regulated by the Environment Agency through the Environmental Permit required for the operation of the Proposed Development. In setting discharge limits, the Environment Agency will also have regard to the requirements of The Water Environment (Water Framework Directive (WFD)) (England and Wales) Regulations 2017 (UK Government, 2017b) which requires that all groundwater and surface waters (rivers, lakes, transitional waters, and coastal waters) achieve 'good ecological status' and 'good chemical status'. Ecological status is defined by the biological condition or health of a watercourse, in combination with water quality and physical conditions that underpin biological conditions. Compliance with the WFD Regulations is therefore consistent with requirements for maintenance of the extent/

distribution, structure/ function and/ or conservation status of European Sites and their qualifying features.

- 7.5.10. ~~Whilst~~An assessment of the treated effluent proposed discharge from the Proposed Development will be covered by has been made for purposes of a separate recent application for the necessary Environmental Permit it is assumed for the Proposed Development. This assessment has confirmed that the Environment Agency will reapply the discharge parameters set within remain unchanged from the previously consented and permitted Keadby CCS Power Station (Environmental Permit (EPR/YP3133LL/V013) to granted 18 June 2025). Keadby CCS will not be built if the Proposed Development given that only one scheme would be built. Therefore, the final design is implemented. So, in terms of the parameters for water pollution assessment, the Proposed Development will be undertaken to achieve these parameters and it is confirmed that it can meet these parameters. The represents a like for like alternative to Keadby CCS.
- 7.5.11. This includes consideration of the chloride that could result from use of sodium hypochlorite as a biocide. Continuous application of sodium hypochlorite could result in free chlorine residuals reaching freshwater bodies as chlorine applied as disinfectant is unstable and easily converted to chloride.
- 7.5.12. The assessment for the Environmental Permit has been made in accordance with the relevant emission limits and Environment Agency guidance (Environment Agency and Defra, 2025b) for the assessment of potential environmental impacts associated with discharging hazardous chemicals and elements to surface water using their H1 screening assessment tool. The H1 assessment tool can be used to carry out an initial screening assessment of the potential impact of a released effluent to its receiving water, relative to established Environmental Quality Standards (EQSs). If the concentration of the pollutant fails the initial EQS screening criteria, then several other tests are also applied to the discharge, dependent upon the type of receiving water. If the initial test is passed, then the concentration of the pollutant would not be at a level likely to result in environmental harm and no further assessment is required.
- 7.5.13. The assessment for the Environmental Permit has been made in the absence of the Keadby 1 cooling water flow, as this represents the worst case for dispersion. The total volume of substances discharged is confirmed to remain the same regardless of the presence or absence of cooling water from Keadby 1. There is no readily available river flow data for the River Trent near to Keadby, and therefore river flow data for the upstream river monitoring station 28022 River Trent at North Muskham, which is the last upstream flow monitoring station on the River Trent, has been acquired from has been collated from the National River Flow Archive. North Muskham is located approximately 40 miles upstream of

the location of the discharge and hence may underestimate (be more worst-case/ precautionary) the flow in the river at the discharge point. A Q95 river water flow rate of 28.9m³/s has been used in the assessment.

7.5.14. The screening test determined that all contaminants (except ammonia) present within the discharge are insignificant as summarised below in Table 3.

Table 3 – Details of Discharge Pollutants

<u>Source</u>	<u>Keadby 2</u>	<u>Keadby CCS/ Keadby Next Generation</u>	<u>Combined effluent</u>
<u>Release Rate (m³/s)</u>	<u>0.1</u>	<u>0.1</u>	<u>0.2</u>
<u>Chloride (µg/l)</u>	<u>630,000</u>	<u>630,000</u>	<u>630,000</u>
<u>Copper (µg/l)</u>	<u>36</u>	<u>36</u>	<u>36</u>
<u>Fluoride (µg/l)</u>	<u>48</u>	<u>48</u>	<u>48</u>
<u>Iron (µg/l)</u>	<u>1,400</u>	<u>1,400</u>	<u>1,400</u>
<u>Sulphate SO₄ (µg/l)</u>	<u>1,000,000</u>	<u>1,000,000</u>	<u>1,000,000</u>

7.5.15. The total ammonia within the effluent was considered further through a detailed CORMIX water quality modelling study. Thermal discharges were also modelled.

7.5.16. A regional hydrodynamic model was collected from the Environment Agency to provide the water level and flow speed information for CORMIX model inputs. The model review showed that the tidal levels over spring-neap tidal cycles are well reproduced, and the model shows a reasonable simulation of the Keadby site.

7.5.17. The discharge velocity of 1.32m/s and existing invert level of pipe at - 3.05m AOD have been used as inputs for the modelling study. It requires pumped outfalls if the required velocity is not achievable for gravity systems.

7.5.18. CORMIX water quality modelling was carried out for the total ammonia and thermal discharge. Modelled plume extents were explored for the specified concentration, 0.3mg/l for the total ammonia and 2.0°C excess for temperatures. The results provide the maximum plume width across

the channel and plume length along the channel downstream/ upstream from the outfall location.

7.5.19. Both total ammonia and thermal plumes are attached to the left riverbank (looking downstream) in a confined small area. For the total ammonia, the worst-cases were equivalent to 10% and 20% of total channel width and with a worst-case predicted maximum plume length along the riverbank of 163.1m. The maximum predicted extents of 2°C ambient water temperature was 1.2m into the channel, representing less than 1% of the total channel width.

7.5.20. The results of the modelling found that the thermal plume temperatures at the edge of the mixing zone would not exceed the thresholds for thermal discharges into the Humber Estuary SAC and Ramsar site, and that the temperature uplift of 2°C in the mixing zone would comply with the requirement (for the protection of fish) that it not occupy more than 25% of the cross section of the Estuary for more than 5% of the time (UKTAG, 2008). Consequently, it would not form a barrier to fish migration across the whole estuary or block areas of the estuary through which fish are likely to pass.

7.5.21. It was therefore concluded from the modelling simulations that the total ammonia and thermal effluent discharge into the Humber Estuary SAC and Ramsar site would have a very limited impact on the water quality in the designations, being demonstrated that the plumes are rapidly diluted and reach the established water quality standards.

7.4.11, 7.5.22. In addition to the above modelling results, the following emission limits were set within the permit issued in 2025 for Keadby CCS to prevent environmental harm along with (where required) monitoring at point of discharge into the Keadby 1 cooling water culvert (i.e. upstream of the point of final discharge to the River Trent) ~~will therefore~~. These limits can also reasonably be ~~(as was expected to apply to the case for Proposed Development given it maintains the discharge parameters of Keadby CCS)~~;

- pH 6-9 (continuous monitoring);
- daily maximum flow rate 83.5 l/s (daily monitoring);
- residual chlorine 0.2mg/l Cl₂;
- conductivity <50000uS/cm
- oil and grease – no visible emission (daily monitoring);
- absolute discharge temperature 35°C (continuous monitoring)
- cadmium shall be controlled by limiting the limiting of the concentration of cadmium or its compounds in the raw materials as: 46% sodium hydroxide <500µg/kg 98% sulphuric acid <1000µg/kg water treatment chemicals <400µg/kg;

- mercury shall be controlled by limiting the limiting of the concentration of cadmium or its compounds in the raw materials -as: - 46% sodium hydroxide <500µg/kg 98% sulphuric acid <1000µg/kg water treatment chemicals <400µg/kg.

~~7.4.12. Long term monitoring of discharges and water quality is also a matter. These additional requirements are all met by the Proposed Development as the Environmental Permit application recently submitted for the permitting regime and this will therefore be Proposed Development does not diverge from the parameters agreed with the Environment Agency and secured for Keadby CCS through Environmental Permit.~~

~~7.4.13. The Proposed Development will not be permitted to operate until EPR/YP3133LL/V013. The worst-case combined effluent discharge from the Proposed Development and Keadby 2 operating has therefore been previously and recently agreed as insignificant in all the necessary Environmental Permit has been obtained. Prior to granting the Environmental Permit for Keadby CCS Power Station, the Environment Agency reviewed the Water Impact Assessment prepared for and submitted with screening tests. In relation to the permit application and also undertook a HRA. In making this assessment the worst case scenarios were considered included both Keadby CCS discharging with Keadby 1 and 2, and a scenario whereby Keadby 1 was no longer operating and discharging cooling water (i.e. a baseline without Keadby 1). This latter scenario represents the worst case for dispersion of pollutants and thermal discharges as there would be no dilution effect from the Keadby 1 cooling water flow (the volume of which, as stated above, grossly exceeds the combined discharges of Keadby CCS and Keadby 2).~~

~~7.4.14.7.5.23. #development, it was concluded by the Environment Agency (2025) that there would no adverse effect on the integrity of the Humber Estuary SAC and Ramsar site designations from the discharge of treated effluent. This assessment was shared with Natural England who raised no concerns. The combined effluent discharge from Keadby CCS and Keadby 2 operating with or without Keadby 1 was found to be insignificant in all screening tests with the exception of the thermal plume which required additional modelling (Environment Agency, 2025).~~

~~7.4.15. The combined thermal discharge of cooling water from Keadby 2 and Keadby CCS operating concurrently was modelled using the CORMIX hydrodynamic modelling software. The maximum predicted extents of 2°C ambient water temperature was 1.2m into the channel, representing less than 1% of the total channel width. Therefore the results of the modelling found that the thermal plume temperatures at the edge of the mixing zone would not exceed the thresholds for thermal discharges into European Marine Sites designated under the Habitats Directive under the Water Framework Directive, and also that the temperature uplift of 2°C in the~~

~~mixing zone would not occupy more than 25% of the cross section of the Estuary for more than 5% of the time (UKTAG, 2008). Consequently, it would not form a barrier to fish migration across the whole estuary or block areas of the estuary through which fish are likely to pass (Environment Agency, 2025).~~

~~7.4.16-7.5.24.~~ Given the committed design approach to achieve legislative compliance in relation to prevention of water pollution (which is secured by a requirement of the **Draft DCO (Application Document Ref. 3.1)**), the ability to achieve the treated effluent parameters previously agreed and permitted in relation to Keadby CCS Power Station as set out in the Environmental Permit application for the Proposed Development, and the controls imposed by the process for obtaining the Environmental Permit and other consents, it is concluded that there will be no adverse effect on the integrity of the relevant European Sites as a result of water pollution impacts on qualifying habitats and species during operation of the Proposed Development.

7.5.7.6. Impacts on the Foraging Resources of Qualifying Birds - Noise and Vibration Impacts on Fish During the Construction and Decommissioning Period

~~7.5.1-7.6.1.~~ Underwater noise and vibration during installation and removal of a cofferdam (if required) may result in periodic temporary but highly localised disturbance to fish species within the Stainforth and Keadby Canal, deterring fish activity in areas close to construction activities, and possible injury of fish. This could directly but temporarily affect the fish species foraged by birds if the canal (which is not part of a European Site) were to be considered functionally linked habitat for the qualifying bird species of the Humber Estuary SPA and Ramsar site. However, in Section 7.2 it is explained in detail that there is no evidence for any more than an incidental presence by qualifying bird species within the potential zone of influence.

~~7.5.2-7.6.2.~~ The area affected by the proposed construction works does not present habitat features that would render it a particular focal area for large numbers of fish compared to the wider canal. Further, it is noted that the baseline setting of the Canal Water Abstraction is already subject to noise and visual disturbances from a variety of sources that is likely to reduce the attractiveness of this section of the canal for bird species.

~~7.5.3-7.6.3.~~ Installation of a cofferdam would be the noisiest period of works due to the need for piling and this would be for a duration of up to 25 days and would not be undertaken continuously. Piling will be spread throughout the installation period with regular breaks to allow for tolerance checks and the addition of bracing and pile ties required for the stability and strength of the cofferdam. Piling will therefore be intermittent, typically for periods of

15 minutes, throughout the cofferdam construction programme, with gaps between piling when no underwater noise and vibration is produced.

7.5.4-7.6.4. The impact of underwater noise and vibration on fish ranges from behavioural responses to auditory injury, with the magnitude of impact dependent on the intensity and duration of the sound. In the most extreme cases, such as explosions from the detonation of unexploded ordnance, underwater noise and vibration results in tissue injury or mortality. Sound propagation calculations indicate that physical injury to fish is highly unlikely to occur unless fish are in very close proximity i.e. within 10m of the sound source from impact piling (refer to **ES Volume II Appendix 11F (Application Document Ref. 6.3)**)).

7.5.5-7.6.5. A temporary impairment in the hearing of all fish species (TTS) is predicted up to a maximum distance of 40m from the sound source for a 15-minute exposure (which would be the typical maximum duration of each discrete period of piling). This increases to 101m for a continuous 60-minute exposure. It is anticipated that impact piling is only likely to occur without interruption for a period of between 15 and 30 minutes, after which there will be a break in the underwater sound produced. So, the zone of influence for potential hearing impairment will be somewhere between these two distances (refer to **ES Volume II Appendix 11F (Application Document Ref. 6.3)**)).

7.5.6-7.6.6. While acknowledging these potential pathway for an impact on fish, standard mitigation for impact piling in marine waters will be adopted (JNCC, 2010). Mitigation is proposed to protect fish species during piling for installation of the cofferdam. Thus, a soft-start or slow ramp-up of piling hammer power will be employed at the commencement of any impact piling activity or after a break of more than 10 minutes. This will assist in allowing sound levels to increase gradually, and any fish in the immediate vicinity of piling (i.e. where physical injury could occur) has an opportunity to make a behavioural response to the sound and move away before any permanent or temporary injury is likely to occur. This is allowed for within the **Outline CEMP (Application Document Ref. 7.4)** and will be secured via the final CEMP.

7.5.7-7.6.7. Fish that move away from the zone of influence for noise and vibration impacts would not be lost to the population or become unavailable to foraging birds. Should they move to another location in the canal beyond the localised zone of influence of noise and vibration from the cofferdam, they would ~~still~~ remain within the section of the canal that could be considered functionally linked ~~land~~ habitat. The Natural England defined impact risk zone for the Humber Estuary SPA and Ramsar site indicates that this encompasses habitats up to 10km from the European sites.

7.5.8-7.6.8. Re-establishment of fish species presence would also be expected on cessation of works (both during breaks in construction activity, and

immediately after works for installation or removal of the cofferdam). There would be no barriers to re-establishment of fish species given the maintenance of connectivity to the wider canal.

7.5.9-7.6.9. Given the protective measures for fish and the limited zone of influence, it is concluded that there will be no adverse effect on the integrity of the relevant European Sites as a result of noise and vibration impacts on foraging resources during construction and decommissioning of the Proposed Development.

7.6.7.7. Impacts on the Foraging Resources of Qualifying Birds - Pollution Impacts on Fish and Invertebrates During the Operational Period

7.6.1-7.7.1. The Appropriate Assessment of the atmospheric pollution and water pollution pathways concluded no adverse effect on the integrity of the relevant European Sites. Given this, there would be no harm to the natural environment supporting foraging resources of fish and river lamprey.

7.6.2-7.7.2. It is concluded that there will be no adverse effect on the integrity of the relevant European Sites ~~as a result~~because of air ~~or~~ water pollution impacts on foraging resources during operation of the Proposed Development.

8. In-Combination Effects with other Plans or Projects

- 8.1.1. It is a requirement of Regulation 63(1)(a) of the Habitats Regulations to not only assess the impacts of a development project alone, but also to investigate whether there might be 'in-combination' effects with other projects or plans (schemes).
- 8.1.2. For the purposes of this HRA, potentially relevant schemes which may act in-combination with the Proposed Development have been identified (see **Appendix F**) with reference to the information collated for **ES Volume I Chapter 19**: Cumulative and Combined Effects (-**Application Document Ref. 6.2**). The pathways for impact have been considered as covered above in Sections 6 and 7.
- 8.1.3. In specific relation to construction and decommissioning traffic air quality impact assessment (**ES Volume I Chapter 8**: Air Quality, **Application Document Ref. 6.2**), it should be noted that the assessment presented above in Sections 5 to 7 Section 6 of this report has already considered potential in-combination effects with relevant consented other schemes (including The wider construction, operational and decommissioning air quality impact assessments in Sections 7 and 8 has accounted for the operational Keadby 2 Power Station) and other relevant consented operational schemes within the baseline, as this is a requirement of good practice air quality impact assessment methods. Specifically, the air quality impact assessment: No other developments (as stated previously in Sections 6 and 7) are identified in Chapter 21 of the ES that require further consideration in relation to potential in-combination air quality effects.
- ~~confirms that cumulative impacts from existing sources of pollution in the area are accounted for in the adoption of site specific background pollutant concentrations from archived and published sources; and~~
 - ~~recognises that there is a potential impact on local air quality from emission sources, and therefore considers relevant schemes identified in ES Volume I Chapter 19: Cumulative and Combined Effects of the ES (Application Document Ref. 6.2) (as listed in Appendix F of this report).~~
- 8.1.4. There is only potential for in-combination effects where the Proposed Development has the same potential impact pathways as other schemes on the same European Sites.
- 8.1.5. Most of the identified schemes, as screened in **Appendix F**, are confirmed to be of insufficient scale and/ or are located at too great a distance from

the relevant European Sites to be likely to interact with the Proposed Development to produce ~~a-LSE~~ELSEs through the above impact pathways.

- 8.1.6. Some schemes are of potential relevance during construction or operation but are insufficiently advanced or defined in the planning/ consenting process to be a certain part of the future baseline within which the Proposed Development needs to be assessed. As noted in **Appendix F**, legal precedent establishes that it is not appropriate to undertake a speculative assessment of projects or scenarios for which there is no information to inform a robust in-combination assessment.
- 8.1.7. Consequently, it is considered that these schemes will need to undertake their own HRA, including an in-combination assessment taking account of the Proposed Development, when they are ready to be submitted under the relevant consenting regimes. It will be the responsibility of these future schemes to consider the Proposed Development (the DCO or planning applications accompanied by EIA/ HRA for which will have been submitted at that time) when undertaking this process.
- 8.1.8. Based on the information given in **Appendix F**, there are no likely in-combination effects associated with the Proposed Development, and this can be **screened out** of Appropriate Assessment.

9. Conclusions

- 9.1.1. Following assessment of the potential pathways by which the Proposed Development might impact European Sites, alone or in-combination with other schemes, it is concluded that there were only a limited number of potential pathways for a LSE on European Sites. These related to visual and noise disturbance of qualifying species during construction, operation (birds only) and decommissioning, airatmospheric pollution during construction, operation and decommissioning, water pollution during operation, and impacts on the foraging resources of qualifying species during construction, operation and decommissioning.
- 9.1.2. Following Appropriate Assessment, and consideration of mitigation options which form part of the committed design of the Proposed Development and are proposed to be secured by ~~Requirement~~Requirements of the draft DCO (**Application Document Ref. 3.1**), it is concluded that the relevant impact pathways would not have an adverse effect on the integrity of any European Sites.
- 9.1.3. Accordingly, it is not necessary to carry out any further stages of HRA.

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Appendix A Summary Table of the Relevant European Sites, Qualifying Features, Pathways and Designations

Site	Qualifying feature	Pathway of effect	Derogations
Humber Estuary SAC	Sandbanks which are slightly covered by sea water all the time	Atmospheric pollution Beyond zone of influence for water pollution.	None proposed
	Estuaries	Atmospheric pollution Water pollution	None proposed
	Mudflats and sandflats not covered by seawater at low tide	As above.	-
	Coastal lagoons	Atmospheric pollution Beyond zone of influence for water pollution.	None proposed
	<i>Salicornia</i> and other annuals colonising mud and sand	Atmospheric pollution.	None proposed
	Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>)	As above.	-
	Embryonic shifting dunes	As above.	-
	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('White dunes')	As above.	-
	Fixed dunes with herbaceous vegetation ('Grey dunes')	As above.	-
	Dunes with <i>Hippophae rhamnoides</i>	As above.	-
	Sea lamprey, <i>Petromyzon marinus</i>	Underwater sound and vibration. Water pollution.	None proposed.

Site	Qualifying feature	Pathway of effect	Derogations
		Entrapment, entrainment and impingement. Temporary or permanent impacts on foraging resources.	
	River lamprey, <i>Lampetra fluviatilis</i>	As above	None proposed.
	Grey seal, <i>Halichoerus grypus</i>	None, beyond the zone of influence of the Proposed Development (agreed with Appropriate Nature Conservation Body).	-
Humber Estuary Ramsar site	The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.	Atmospheric pollution. Water pollution.	None proposed.
	The Humber Estuary Ramsar site supports a breeding colony of grey seals <i>Halichoerus grypus</i> at Donna Nook.	None, beyond the zone of influence of the Proposed Development (agreed with Appropriate Nature Conservation Body).	-

Site	Qualifying feature	Pathway of effect	Derogations
	The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site are the most north-easterly breeding site in Great Britain of the natterjack toad <i>Bufo calamita</i> .	As above.	-
	Assemblages of international importance: 153,934 waterfowl, non-breeding season (5 year peak mean 1996/97-2000/2001)	Noise and visual disturbance. Temporary or permanent impacts on foraging resources. Water pollution. Atmospheric pollution.	None proposed.
	Species/populations occurring at levels of international importance: <ul style="list-style-type: none"> - Common shelduck, <i>Tadorna tadorna</i> (breeding and wintering); - Eurasian golden plover, <i>Pluvialis apricaria</i> (wintering); - Red knot, <i>Calidris canutus islandica</i> (wintering); - Dunlin, <i>Calidris alpina alpina</i> (wintering); - Black-tailed godwit, <i>Limosa limosa islandica</i> (wintering); - Bar-tailed godwit, <i>Limosa lapponica lapponica</i> (wintering); and - Common redshank, <i>Tringa tetanus brittanica</i> (wintering). 	As above.	None proposed.

Site	Qualifying feature	Pathway of effect	Derogations
	<p>The Humber Estuary acts as an important migration route for both river lamprey <i>Lampetra fluviatilis</i> and sea lamprey <i>Petromyzon marinus</i> between coastal waters and their spawning areas.</p>	<p>Underwater sound and vibration.</p> <p>Water pollution.</p> <p>Entrapment, entrainment and impingement.</p> <p>Temporary or permanent impacts on foraging resources.</p>	<p>None proposed.</p>
<p>Humber Estuary SPA</p>	<p>Species/populations occurring at levels of international importance:</p> <ul style="list-style-type: none"> - <i>Botaurus stellaris</i>; Great bittern (Non-breeding); - <i>Botaurus stellaris</i>; Great bittern (Breeding); - <i>Tadorna tadorna</i>; Common shelduck (Non-breeding); - <i>Circus aeruginosus</i>; Eurasian marsh harrier (Breeding); - <i>Circus cyaneus</i>; Hen harrier (Non-breeding); - <i>Recurvirostra avosetta</i>; Pied avocet (Non-breeding); - <i>Recurvirostra avosetta</i>; Pied avocet (Breeding); - <i>Pluvialis apricaria</i>; European golden plover (Non-breeding); - <i>Calidris canutus</i>; Red knot (Non-breeding); - <i>Calidris alpina alpina</i>; Dunlin (Non-breeding); - <i>Philomachus pugnax</i>; Ruff (Non-breeding) - <i>Limosa limosa islandica</i>; Black-tailed godwit (Non-breeding); 	<p>Noise and visual disturbance.</p> <p>Temporary or permanent impacts on foraging resources.</p> <p>Water pollution.</p> <p>Atmospheric pollution</p>	<p>None proposed.</p>

Site	Qualifying feature	Pathway of effect	Derogations
	<ul style="list-style-type: none"> - <i>Limosa lapponica</i>; Bar-tailed godwit (Non-breeding); - <i>Tringa totanus</i>; Common redshank (Non-breeding); and - <i>Sterna albifrons</i>; Little tern (Breeding) Waterbird assemblage. 		
Thorne Moor SAC	Degraded raised bogs still capable of natural regeneration.	Atmospheric pollution	None proposed
Hatfield Moor SAC	Degraded raised bogs still capable of natural regeneration.	Atmospheric pollution	None proposed
Thorne and Hatfield Moors SPA	European nightjar (<i>Caprimulgus europaeus</i>) (Breeding)	Atmospheric pollution	None proposed

Appendix B Citations and Natura 2000 Data Sheets for the Relevant European Sites

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [REDACTED]

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0030170
SITENAME Humber Estuary

TABLE OF CONTENTS

- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0030170	Back to top
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1.3 Site name

Humber Estuary

1.4 First Compilation date 2007-08	1.5 Update date 2015-12
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1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough
PE1 1JY
Email:

Date site proposed as SCI: 2007-08
Date site confirmed as SCI: 2008-12
Date site designated as SAC: 2009-12

National legal reference of SAC designation:

Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010
(<http://www.legislation.gov.uk/uksi/2010/490/contents/made>).

2. SITE LOCATION

[Back to top](#)

			784.46	0	G	C		B	C	C
2110			18.33	0	G	C		A	C	C
2120			14.66	0	G	C		B	C	C
2130	X		14.66	0	G	C		C	C	C
2160			65.98	0	G	C		B	C	C

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species			Population in the site							Site assessment				
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D		A B C	
						Min	Max				Pop.	Con.	Iso.	Glo.
F	1102	Alosa alosa			p				P	DD	D			
F	1103	Alosa fallax			p				P	DD	D			
M	1364	Halichoerus grypus			p	1800	1800	i		G	C	B	B	C
F	1099	Lampetra fluviatilis			p				P	DD	A	B	C	C
F	1095	Petromyzon marinus			p	251	500	i		M	B	C	C	C
M	1365	Phoca vitulina			p				P	DD	D			

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [redacted])
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

4.1 General site character

Habitat class	% Cover
N03	4.4
N07	0.4
N04	0.4
N02	94.9
Total Habitat Cover	100.10000000000002

Other Site Characteristics

1 Terrestrial: Soil & Geology: shingle, sedimentary, sandstone, neutral, mud, sand, alluvium, clay 2 Terrestrial: Geomorphology and landscape: coastal, floodplain, lowland 3 Marine: Geology: gravel, mud, sedimentary, sand, sandstone/mudstone, clay, shingle, limestone/chalk 4 Marine: Geomorphology: shingle bar, lagoon, islands, estuary, subtidal sediments (including sandbank/mudbank), intertidal sediments (including sandflat/mudflat), cliffs

4.2 Quality and importance

Sandbanks which are slightly covered by sea water all the time for which the area is considered to support a significant presence. Estuaries for which this is considered to be one of the best areas in the United Kingdom. Mudflats and sandflats not covered by seawater at low tide for which this is considered to be one of the best areas in the United Kingdom. Coastal lagoons for which the area is considered to support a significant presence. Salicornia and other annuals colonising mud and sand for which the area is considered to support a significant presence. Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) for which the area is considered to support a significant presence. Embryonic shifting dunes for which the area is considered to support a significant presence. which is considered to be rare as its total extent in the United Kingdom is estimated to be less than 1000 hectares. Shifting dunes along the shoreline with *Ammophila arenaria* (?white dunes?) for which the area is considered to support a significant presence. Dunes with *Hippophae rhamnoides* for which the area is considered to support a significant presence. which is considered to be rare as its total extent in the United Kingdom is estimated to be less than 1000 hectares. Fixed dunes with herbaceous vegetation (?grey dunes?) for which the area is considered to support a significant presence. *Petromyzon marinus* for which the area is considered to support a significant presence. *Lampetra fluviatilis* for which the area is considered to support a significant presence. *Halichoerus grypus* for which the area is considered to support a significant presence.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	M01		B
H	E02		O
H	J02		B
H	H02		B
H	K01		I

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	D05		I
H	A02		I
H	B02		I
H	A04		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation

advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

[Back to top](#)

5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK01	1.8	UK04	100.0		

6. SITE MANAGEMENT

[Back to top](#)

6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [REDACTED] (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (<i>Spartinion maritimae</i>)	57
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with <i>Empetrum nigrum</i>	57
2150	Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>)	57
2160	Dunes with <i>Hippophya rhamnoides</i>	57
2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with <i>Juniperus</i> spp.	57
2330	Inland dunes with open <i>Corynephorus</i> and <i>Agrostis</i> grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	57
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscusae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, screes and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Scree, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

EC Directive 79/409 on the Conservation of Wild Birds Special Protection Area (SPA)

Name: Humber Estuary

Unitary Authorities/Counties: City of Kingston-upon-Hull, East Riding of Yorkshire, Lincolnshire, North East Lincolnshire, North Lincolnshire

Component SSSIs: The SPA encompasses all or parts of the following Sites of Special Scientific Interest (SSSIs): Humber Estuary SSSI, North Killingholme Haven Pits SSSI, Saltfleetby-Theddlethorpe Dunes SSSI, and The Lagoons SSSI.

Site description: The Humber Estuary is located on the east coast of England, and comprises extensive wetland and coastal habitats. The inner estuary supports extensive areas of reedbed, with areas of mature and developing saltmarsh backed by grazing marsh in the middle and outer estuary. On the north Lincolnshire coast, the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools. Parts of the estuary are owned and managed by conservation organisations. The estuary supports important numbers of waterbirds (especially geese, ducks and waders) during the migration periods and in winter. In summer, it supports important breeding populations of bittern *Botaurus stellaris*, marsh harrier *Circus aeruginosus*, avocet *Recurvirostra avosetta* and little tern *Sterna albifrons*.

Size of SPA: The SPA covers an area of 37,630.24 ha.

Qualifying species:

The site qualifies under **article 4.1** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season:

Annex I species	Count and season	Period	% of GB population
Avocet <i>Recurvirostra avosetta</i>	59 individuals – wintering	5 year peak mean 1996/97 – 2000/01	1.7%
Bittern <i>Botaurus stellaris</i>	4 individuals – wintering	5 year peak mean 1998/99 – 2002/03	4.0%
Hen harrier <i>Circus cyaneus</i>	8 individuals – wintering	5 year peak mean 1997/98 – 2001/02	1.1%
Golden plover <i>Pluvialis apricaria</i>	30,709 individuals – wintering	5 year peak mean 1996/97 – 2000/01	12.3%
Bar-tailed godwit <i>Limosa lapponica</i>	2,752 individuals – wintering	5 year peak mean 1996/97 – 2000/01	4.4%
Ruff <i>Philomachus pugnax</i>	128 individuals – passage	5 year peak mean 1996-2000	1.4%
Bittern <i>Botaurus stellaris</i>	2 booming males – breeding	3 year mean 2000-2002	10.5%
Marsh harrier <i>Circus aeruginosus</i>	10 females – breeding	5 year mean 1998-2002	6.3%
Avocet <i>Recurvirostra avosetta</i>	64 pairs – breeding	5 year mean 1998 – 2002	8.6%
Little tern <i>Sterna albifrons</i>	51 pairs – breeding	5 year mean 1998-2002	2.1%

The site qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the biogeographical populations of the following regularly occurring migratory species (other than those listed in Annex I) in any season:

Migratory species	Count and season	Period	% of subspecies/ population
Shelduck <i>Tadorna tadorna</i>	4,464 individuals – wintering	5 year peak mean 1996/97 – 2000/01	1.5% Northwestern Europe (breeding)
Knot <i>Calidris canutus</i>	28,165 individuals – wintering	5 year peak mean 1996/97 – 2000/01	6.3% <i>islandica</i>
Dunlin <i>Calidris alpina</i>	22,222 individuals – wintering	5 year peak mean 1996/97 – 2000/01	1.7% <i>alpina</i> , Western Europe (non-breeding)
Black-tailed godwit <i>Limosa limosa</i>	1,113 individuals – wintering	5 year peak mean 1996/97 – 2000/01	3.2% <i>islandica</i>
Redshank <i>Tringa totanus</i>	4,632 individuals – wintering	5 year peak mean 1996/97 – 2000/01	3.6% <i>britannica</i>
Knot <i>Calidris canutus</i>	18,500 individuals – passage	5 year peak mean 1996 – 2000	4.1% <i>islandica</i>
Dunlin <i>Calidris alpina</i>	20,269 individuals – passage	5 year peak mean 1996 – 2000	1.5% <i>alpina</i> , Western Europe (non-breeding)
Black-tailed godwit <i>Limosa limosa</i>	915 individuals – passage	5 year peak mean 1996 – 2000	2.6% <i>islandica</i>
Redshank <i>Tringa totanus</i>	7,462 individuals – passage	5 year peak mean 1996 – 2000	5.7% <i>britannica</i>

Bird counts from: Wetland Bird Survey (WeBS) database and *The Humber Estuary: A comprehensive review of its nature conservation interest* (Allen et al. 2003).

Assemblage qualification:

The site qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by over 20,000 waterbirds (waterbirds as defined by the Ramsar Convention) in any season:

In the non-breeding season, the area regularly supports 153,934 individual waterbirds (five year peak mean 1996/97 – 2000/01), including dark-bellied brent goose *Branta bernicla bernicla*, shelduck *Tadorna tadorna*, wigeon *Anas penelope*, teal *Anas crecca*, mallard *Anas platyrhynchos*, pochard *Aythya ferina*, scaup *Aythya marila*, goldeneye *Bucephala clangula*, bittern *Botaurus stellaris*, oystercatcher *Haematopus ostralegus*, avocet *Recurvirostra avosetta*, ringed plover *Charadrius hiaticula*, golden plover *Pluvialis apricaria*, grey plover *P. squatarola*, lapwing *Vanellus vanellus*, knot *Calidris canutus*, sanderling *C. alba*, dunlin *C. alpina*, ruff *Philomachus pugnax*, black-tailed godwit *Limosa limosa*, bar-tailed godwit *L. lapponica*, whimbrel *Numenius phaeopus*, curlew *N. arquata*, redshank *Tringa totanus*, greenshank *T. nebularia* and turnstone *Arenaria interpres*.

Non-qualifying species of interest: The SPA is used by non-breeding merlin *Falco columbarius*, peregrine *F. peregrinus* and short-eared owl *Asio flammeus*, and breeding common tern *Sterna hirundo* and kingfisher *Alcedo atthis* (all species listed in Annex I to the EC Birds Directive) in numbers of less than European importance (less than 1% of the GB population).

Status of SPA:

- 1) Humber Flats, Marshes and Coast (Phase 1) SPA was classified on 28 July 1994.
- 2) The extended and renamed Humber Estuary SPA was classified on 31 August 2007.

This citation relates to a site entered in the Register of European Sites for Great Britain. Register reference number: UK9006111 Date of registration: 31 August 2007

On behalf of the Secretary of State for Environment, Food and Rural Affairs

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough
Cambridgeshire PE1 1JY
UK
Telephone/Fax: [REDACTED]
Email: [REDACTED]

FOR OFFICE USE ONLY.

DD MM YY

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Designation date

--	--	--	--	--	--

Site Reference Number

2. Date this sheet was completed/updated:

Designated: 31 August 2007

3. Country:

UK (England)

4. Name of the Ramsar site:

Humber Estuary

5. Designation of new Ramsar site or update of existing site:

This RIS is for: Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area:

The boundary has been extended

** Important note: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site included:

Refer to Annex III of the *Explanatory Notes and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) **hard copy** (required for inclusion of site in the Ramsar List): *yes* ✓ -or- *no* ☐;
- ii) **an electronic format** (e.g. a JPEG or ArcView image) *Yes*
- iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** *yes* ✓ -or- *no* ☐;

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The site boundary is the same as, or falls within, an existing protected area.

For precise boundary details, please refer to paper map provided at designation

8. Geographical coordinates (latitude/longitude):

053 32 59 N 000 00 03 E

9. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Nearest town/city: Kingston-upon-Hull

The Humber Estuary is located on the boundary between the East Midlands Region and the Yorkshire and the Humber Region, on the east coast of England bordering the North Sea.

Administrative region: City of Kingston upon Hull; East Riding of Yorkshire; Humberside; Lincolnshire; North East Lincolnshire; North Lincolnshire

10. Elevation (average and/or max. & min.) (metres): **11. Area** (hectares): 37987.8

Min. -13

Max. 10

Mean No information available

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The Humber Estuary is the largest macro-tidal estuary on the British North Sea coast. It drains a catchment of some 24,240 square kilometres and is the site of the largest single input of freshwater from Britain into the North Sea. It has the second-highest tidal range in Britain (max 7.4 m) and approximately one-third of the estuary is exposed as mud or sand flats at low tide. The inner estuary supports extensive areas of reedbed with areas of mature and developing saltmarsh backed in places by limited areas of grazing marsh in the middle and outer estuary. On the north Lincolnshire coast the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools. The Estuary regularly supports internationally important numbers of waterfowl in winter and nationally important breeding populations in summer.

13. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

1, 3, 5, 6, 8

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Ramsar criterion 1

The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.

It is a large macro-tidal coastal plain estuary with high suspended sediment loads, which feed a dynamic and rapidly changing system of accreting and eroding intertidal and subtidal mudflats, sandflats, saltmarsh and reedbeds. Examples of both strandline, foredune, mobile, semi-fixed dunes, fixed dunes and dune grassland occur on both banks of the estuary and along the coast. The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion on the tidal rivers of the Ouse and Trent. Wave exposed sandy shores are found in the outer/open coast areas of the estuary. These change to the more moderately exposed sandy shores and then to sheltered muddy shores within the main body of the estuary and up into the tidal rivers. The lower saltmarsh of the Humber is dominated by common cordgrass *Spartina anglica* and annual glasswort *Salicornia* communities. Low to mid marsh communities are mostly represented by sea aster *Aster tripolium*, common saltmarsh grass *Puccinellia maritima* and sea purslane *Atriplex portulacoides* communities. The upper portion of the saltmarsh community is atypical, dominated by sea couch *Elytrigia atherica* (*Elymus pycnanthus*) saltmarsh community. In the upper reaches of the estuary, the tidal marsh community is dominated by the common reed *Phragmites australis* fen and sea club rush *Bolboschoenus maritimus* swamp with the couch grass *Elytrigia repens* (*Elymus repens*) saltmarsh community. Within the Humber Estuary Ramsar site there are good examples of four of the five physiographic types of saline lagoon.

Ramsar criterion 3

The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site are the most north-easterly breeding site in Great Britain of the natterjack toad *Bufo calamita*.

Ramsar criterion 5

Assemblages of international importance:

153,934 waterfowl, non-breeding season

(5 year peak mean 1996/97-2000/2001)

Ramsar criterion 6 – species/populations occurring at levels of international importance.

Eurasian golden plover, *Pluvialis apricaria*

altifrons subspecies – NW Europe, W Continental Europe, NW Africa population

17,996 individuals, passage, representing an average of 2.2% of the population

(5 year peak mean 1996-2000)

Red knot, *Calidris canutus*

islandica subspecies

18,500 individuals, passage, representing an average of 4.1% of the population

(5 year peak mean 1996-2000)

Dunlin, *Calidris alpina*

alpina subspecies – Western Europe (non-breeding) population

20,269 individuals, passage, representing an average of 1.5% of the population
(5 year peak mean 1996-2000)

Black-tailed godwit, *Limosa limosa*

islandica subspecies

915 individuals, passage, representing an average of 2.6% of the population
(5 year peak mean 1996-2000)

Common redshank, *Tringa totanus*

britannica subspecies

7,462 individuals, passage, representing an average of 5.7% of the population
(5 year peak mean 1996-2000)

Common shelduck, *Tadorna tadorna*

Northwestern Europe (breeding) population

4,464 individuals, wintering, representing an average of 1.5% of the population
(5 year peak mean 1996/7-2000/1)

Eurasian golden plover, *Pluvialis apricaria*

altifrons subspecies – NW Europe, W Continental Europe, NW Africa population

30,709 individuals, wintering, representing an average of 3.8% of the population
(5 year peak mean 1996/7-2000/1)

Red knot, *Calidris canutus*

islandica subspecies

28,165 individuals, wintering, representing an average of 6.3% of the population
(5 year peak mean 1996/7-2000/1)

Dunlin, *Calidris alpina*

alpina subspecies – Western Europe (non-breeding) population

22,222 individuals, wintering, representing an average of 1.7% of the population
(5 year peak mean 1996/7-2000/1)

Black-tailed godwit, *Limosa limosa*

islandica subspecies

1,113 individuals, wintering, representing an average of 3.2% of the population
(5 year peak mean 1996/7-2000/1)

Bar-tailed godwit, *Limosa lapponica*

lapponica subspecies

2,752 individuals, wintering, representing an average of 2.3% of the population
(5 year peak mean 1996/7-2000/1)

Common redshank, *Tringa totanus brittanica* subspecies

4,632 individuals, wintering, representing an average of 3.6% of the population
(5 year peak mean 1996/7-2000/1)

Ramsar criterion 8

The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas.

Ramsar criterion 5

Assemblages of international importance:

Species with peak counts in winter:

153934 waterfowl (5 year peak mean 1998/99-2002/2003)

Ramsar criterion 6 – species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

Species with peak counts in spring/autumn:

European golden plover , <i>Pluvialis apricaria apricaria</i> , P. a. altifrons Iceland & Faroes/E Atlantic	17996 individuals, representing an average of 2.2% of the population (1996-2000)
Red knot , <i>Calidris canutus islandica</i> , W & Southern Africa (wintering)	18500 individuals, representing an average of 4.1% of the population (1996-2000)
Dunlin , <i>Calidris alpina alpina</i> , W Siberia/W Europe	20269 individuals, representing an average of 1.5% of the population (1996-2000)
Black-tailed godwit , <i>Limosa limosa islandica</i> , Iceland/W Europe	915 individuals, representing an average of 2.6% of the population (1996-2000)
Common redshank , <i>Tringa totanus totanus</i> ,	7462 individuals, representing an average of 5.7% of the population (1996-2000)
Species with peak counts in winter:	
Common shelduck , <i>Tadorna tadorna</i> , NW Europe	4464 individuals, representing an average of 1.5% of the population (1996/7 to 2000/1)
European golden plover , <i>Pluvialis apricaria apricaria</i> , P. a. altifrons Iceland & Faroes/E Atlantic	30709 individuals, representing an average of 3.8% of the population (1996/7 to 2000/1)
Red knot , <i>Calidris canutus islandica</i> , W & Southern Africa (wintering)	28165 individuals, representing an average of 6.3% of the population (1996/7 to 2000/1)
Dunlin , <i>Calidris alpina alpina</i> , W Siberia/W Europe	22222 individuals, representing an average of 1.7% of the population (1996/7 to 2000/1)

Black-tailed godwit , *Limosa limosa islandica*, 1113 individuals, representing an average of 3.2% of the population (1996/7 to 2000/1)
Iceland/W Europe

Bar-tailed godwit , *Limosa lapponica lapponica*, 2752 individuals, representing an average of 2.3% of the population (1996/7 to 2000/1)
W Palearctic

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm.

See Sections 21/22 for details of noteworthy species

Details of bird species occurring at levels of National importance are given in Section 22

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Atlantic

b) biogeographic regionalisation scheme (include reference citation):

Council Directive 92/43/EEC

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Soil & geology	neutral, shingle, sand, mud, clay, alluvium, sedimentary, sandstone, sandstone/mudstone, limestone/chalk, gravel, nutrient-rich
Geomorphology and landscape	lowland, coastal, floodplain, shingle bar, intertidal sediments (including sandflat/mudflat), estuary, islands, cliffs
Nutrient status	eutrophic
pH	circumneutral
Salinity	brackish / mixosaline, fresh, saline / euhaline
Soil	mainly mineral
Water permanence	usually permanent
Summary of main climatic features	Annual averages (Cleethorpes, 1971–2000) (www.metoffice.com/climate/uk/averages/19712000/sites/cleethorpes.html) Max. daily temperature: 13.1° C Min. daily temperature: 6.4° C Days of air frost: 29.0 Rainfall: 565.4 mm Hrs. of sunshine: 1521.9

General description of the Physical Features:

The Humber estuary is approximately 70 km long from the limit of saline intrusion on the River Ouse at Boothferry to the estuary mouth at Spurn Head, where it enters the North Sea. The area of the estuary is approx. 365 km², and it has a width of 6.6 km at the mouth.

The Humber is a macro-tidal estuary with a tidal range of 7.4 m, the second-largest range in the UK and comparable to other macro-tidal estuaries worldwide. It is a shallow and well mixed estuary, with an average depth of 6.5m rising to 13.2 m at the mouth.

The Humber is the second-largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. Suspended sediment concentrations are high, and are derived from a variety of sources, including marine sediments and eroding boulder clay along the Holderness coast. This is the northernmost of the English east coast estuaries whose structure and function is intimately linked with soft eroding shorelines.

Upstream from the Humber Bridge, the navigation channel undergoes major shifts from north to south banks. This section of the estuary is noteworthy for extensive mud and sand bars, which in places form semi-permanent islands.

The estuary covers the full salinity range from fully marine at the mouth of the estuary (Spurn Head) to the limit of saline intrusion on the Rivers Ouse and Trent). A salinity gradient from north to south bank is observed in the outer estuary, due to the incoming tide flowing along the north bank, while the fresh water keeps to the south bank as it discharges to the sea. As salinity declines upstream, reedbeds and brackish saltmarsh communities fringe the estuary..

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

The Humber catchment covers an area of ca. 24,240 km², more than 20% of the land area of England. Average annual precipitation in the upland areas of the catchment is as much as 1000 mm. Average freshwater flow into the Humber estuary from the rivers is 250 m³s⁻¹, ranging from 60 m³s⁻¹ in drier periods to 450 m³s⁻¹ in wet periods. Peak flows of up to 1500 m³s⁻¹ have been recorded during floods. The rivers Trent and Ouse, which provide the main fresh water flow into the Humber, drain large industrial and urban areas to the south and west (River Trent), and less densely populated agricultural areas to the north and west (River Ouse). The Trent/Ouse confluence is known as Trent Falls.

On the north bank of the Humber estuary the principal river is the river Hull, which flows through the city of Kingston-upon-Hull, and has a tidal length of 32 km, up to the Hempholme Weir. The Hull provides only about 1% of the freshwater input to the estuary. On the south bank, the River Ancholme enters the Humber at South Ferriby, but the tide is excluded by a sluice and a tidal lock. Altogether, the total tidal length of rivers and estuary is 313 km.

There are several major urban centres within the river catchments. Nottingham, Leicester, and the West Midlands/Birmingham conurbation are drained by the Trent, the Leeds-Bradford area in West Yorkshire is drained by the Aire/Calder and the Sheffield/Rotherham/Doncaster area in South Yorkshire is drained by the Don. There are also large rural regions, whose populations are currently experiencing high population growth, while the urban areas are showing a small decline. The 1992 population for the Ouse catchment was 4.1 million, and for the Trent catchment was 7.1 million. The population of Humberside, which comprises North and North-east Lincolnshire, the East Riding of Yorkshire, and Kingston-upon-Hull (Hull), was just under 0.9 million. Land use around the estuary itself is 50-98% agricultural, within only two areas of high population/ industry – the major conurbation around Kingston-upon-Hull (Hull) on the north bank, and several large industrial areas around Grimsby/ Immingham/ Cleesthorpes on the south bank.

The area around the Humber estuary is low-lying, and much land-claim of wetlands and supratidal zones, as well as parts of the intertidal zone, was carried out in the past two centuries. The mid to

outer estuary (Humber Bridge to Spurn Point) changed from a region of low water erosion in the 19th century to one of accretion in the 20th century, nonetheless a net loss of intertidal zone of some 3000 ha has taken place since the mid-19th century. Around the estuary some 894 km² of land are below the 5 m contour, protected by extensive coastal defences. Most of the sediment entering the estuary comes from the North Sea, and a large part of it is believed to come from the continuing erosion of the Holderness Cliffs, which form the coastline to the north of the estuary mouth at Spurn Head. The estuary currently has approximately 1,775 ha of saltmarsh

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Sediment trapping

19. Wetland types:

Marine/coastal wetland

Code	Name	% Area
F	Estuarine waters	66.8
G	Tidal flats	26.4
H	Salt marshes	4.7
E	Sand / shingle shores (including dune systems)	0.8
7	Gravel / brick / clay pits	0.5
Q	Saline / brackish lakes: permanent	0.3
J	Coastal brackish / saline lagoons	0.3
Other	Other	0.1
9	Canals and drainage channels	0.01
Y	Freshwater springs	0.01

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Description

Much of the intertidal area of the Humber Estuary consists of mudflats with fringing saltmarsh. There are smaller areas of intertidal sand flats, and sand dunes. The saltmarsh is both eroding and accreting; although coastal squeeze is resulting in net losses, and cord grass *Spartina anglica* is a major colonising species. In areas of reduced salinity such as the Upper Humber there are extensive areas of common reed *Phragmites australis* with some sea club-rush *Bolboschoenus maritimus*. Mid-level saltmarsh tends to be much more floristically diverse, and in the higher level marsh with its dendritic network of drainage channels, salt pans and borrow pits grasses dominate with thrift *Armeria maritima* where the marsh is grazed by cattle and sheep. Extensive areas of eel grass *Zostera marina* and *Z. nolti* have been known to occur at Spurn Bight, although in recent years records are limited. Behind the sandflats of the Cleethorpes coast the mature sand-dune vegetation contains some locally and nationally rare species including chestnut flat sedge *Blysmus rufus*, bulbous meadow grass *Poa bulbosa* and dense silky-bent *Apera interrupta*. The sand dunes, which cap the shingle spit that forms Spurn Peninsula are dominated by marram grass *Ammophila arenaria* and patches of dense sea buckthorn *Hippophae rhamnoides*.

Ecosystem services

Aesthetic

Education

Food

Recreation

Storm/wave protection

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

None reported

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Birds**Species Information**

Species Information

Birds

Species currently occurring at levels of national importance:

Great bittern, *Botaurus stellaris**stellaris* subspecies – W Europe, NW Africa (breeding) population

2 booming males, breeding, representing an average of 10.5% of the GB population

(3 year mean 2000-2002)

Eurasian marsh harrier, *Circus aeruginosus*

Europe population

10 females, breeding, representing an average of 6.3% of the GB population

(5 year mean 1998-2002)

Pied avocet, *Recurvirostra avosetta*

Western Europe (breeding) population

64 pairs, breeding, representing an average of 8.6% of the GB population

(5 year mean 1998-2002)

Little tern, *Sterna albifrons**albifrons* subspecies, Western Europe (breeding) population

51 pairs, breeding, representing an average of 2.1% of the GB population

(5 year mean 1998-2002)

Dark-bellied brent goose, *Branta bernicla**bernicla* subspecies

2,098 individuals, wintering, representing an average of 2.1% of the GB population

(5 year peak mean 1996/7-2000/1)

Eurasian wigeon, *Anas penelope*

Northwestern Europe (non-breeding) population

5,044 individuals, wintering, representing an average of 1.2% of the GB population

(5 year peak mean 1996/7-2000/1)

Common teal, *Anas crecca**crecca* subspecies, Northwestern Europe (non-breeding population)

2,322 individuals, wintering, representing an average of 1.2% of the GB population

(5 year peak mean 1996/7-2000/1)

Common pochard, *Aythya ferina*

Northeastern & Northwestern Europe (non-breeding) population

719 individuals, wintering, representing an average of 1.2% of the GB population

(5 year peak mean 1996/7-2000/1)

Greater scaup, *Aythya marila*

marila subspecies, Western Europe (non-breeding) population

127 individuals, wintering, representing an average of 1.7% of the GB population

(5 year peak mean 1996/7-2000/1)

Common goldeneye, *Bucephala clangula*

clangula subspecies, Northwestern & Central Europe (non-breeding) population

467 individuals, wintering, representing an average of 1.9% of the GB population

(5 year peak mean 1996/7-2000/1)

Great bittern, *Botaurus stellaris*

stellaris subspecies – W Europe, NW Africa (breeding) population

4 individuals, wintering, representing an average of 4.0% of the GB population

(5 year peak mean 1998/9-2002/3)

Hen harrier, *Circus cyaneus*

Europe population

8 individuals, wintering, representing an average of 1.1% of the GB population

(5 year peak mean 1997/8-2001/2)

Eurasian oystercatcher, *Haematopus ostralegus*

ostralegus subspecies

3,503 individuals, wintering, representing an average of 1.1% of the GB population

(5 year peak mean 1996/7-2000/1)

Pied avocet, *Recurvirostra avosetta*

Western Europe (breeding) population

59 individuals, wintering, representing an average of 1.7% of the GB population

(5 year peak mean 1996/7-2000/1)

Great ringed plover, *Charadrius hiaticula*

hiaticula subspecies

403 individuals, wintering, representing an average of 1.2% of the GB population

(5 year peak mean 1996/7-2000/1)

Grey plover, *Pluvialis squatarola*

squatarola subspecies, Eastern Atlantic (non-breeding) population

1,704 individuals, wintering, representing an average of 3.2% of the GB population

(5 year peak mean 1996/7-2000/1)

Northern lapwing, *Vanellus vanellus*

Europe (breeding) population

22,765 individuals, wintering, representing an average of 1.1% of the GB population

(5 year peak mean 1996/7-2000/1)

Sanderling, *Calidris alba*

Eastern Atlantic (non-breeding) population

486 individuals, wintering, representing an average of 2.3% of the GB population
(5 year peak mean 1996/7-2000/1)

Curlew, *Numenius arquata*

arquata subspecies

3,253 individuals, wintering, representing an average of 2.2% of the GB population
(5 year peak mean 1996/7-2000/1)

Ruddy turnstone, *Arenaria interpres*

interpres subspecies, Northeastern Canada & Greenland (breeding) population

629 individuals, wintering, representing an average of 1.3% of the GB population
(5 year peak mean 1996/7-2000/1)

Great ringed plover, *Charadrius hiaticula*

psammodytes subspecies

1,766 individuals, passage, representing an average of 5.9% of the GB population
(5 year peak mean 1996-2000)

Grey plover, *Pluvialis squatarola*

squatarola subspecies, Eastern Atlantic (non-breeding) population

1,590 individuals, passage, representing an average of 2.3% of the GB population
(5 year peak mean 1996-2000)

Sanderling, *Calidris alba*

Eastern Atlantic (non-breeding) population

818 individuals, passage, representing an average of 2.7% of the GB population
(5 year peak mean 1996-2000)

Ruff, *Philomachus pugnax*

Western Africa (non-breeding) population

128 individuals, passage, representing an average of 1.4% of the GB population
(5 year peak mean 1996-2000)

Whimbrel, *Numenius phaeopus*

islandicus subspecies

113 individuals, passage, representing an average of 2.3% of the GB population
(5 year peak mean 1996-2000)

Common greenshank, *Tringa nebularia*

Northwestern Europe (breeding) population

77 individuals, passage, representing an average of 5.5% of the GB population
(5 year peak mean 1996-2000)

23. Social and cultural values:

Describe if the site has any general social and/or cultural values e.g. fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

Aesthetic

Aquatic vegetation (e.g. reeds, willows, seaweed)

Archaeological/historical site

Environmental education/ interpretation

Fisheries production

Livestock grazing

Non-consumptive recreation

Sport fishing
 Sport hunting
 Tourism
 Transportation/navigation

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? No

If Yes, describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

Ownership category	On-site	Off-site
Non-governmental organisation (NGO)	+	+
Local authority, municipality etc.	+	+
National/Crown Estate	+	+
Private	+	+
Public/communal	+	+

25. Current land (including water) use:

Activity	On-site	Off-site
Nature conservation	+	+
Tourism	+	+
Recreation	+	+
Current scientific research	+	
Cutting of vegetation (small-scale/subsistence)	+	
Fishing: commercial	+	+
Fishing: recreational/sport	+	+
Gathering of shellfish	+	+
Bait collection	+	+
Permanent arable agriculture		+
Permanent pastoral agriculture	+	+
Hunting: recreational/sport	+	+
Industrial water supply	+	+
Industry	+	+
Sewage treatment/disposal	+	+
Harbour/port	+	+

Flood control	+	+
Irrigation (incl. agricultural water supply)		+
Mineral exploration (excl. hydrocarbons)		+
Oil/gas exploration	+	+
Transport route	+	+
Domestic water supply		+
Urban development		+
Non-urbanised settlements		+
Military activities	+	+
Horticulture (incl. market gardening)		+

26. Factors (past, present or potential) adversely affecting the site’s ecological character, including changes in land (including water) use and development projects:

Explanation of reporting category:

1. *Those factors that are still operating, but it is unclear if they are under control, as there is a lag in showing the management or regulatory regime to be successful.*
2. *Those factors that are not currently being managed, or where the regulatory regime appears to have been ineffective so far.*

NA = Not Applicable because no factors have been reported.

Adverse Factor Category	Reporting Category	Description of the problem (Newly reported Factors only)	On-Site	Off-Site	Major Impact?
Disturbance to vegetation through cutting / clearing	1	Reedbeds being cut and cleared on margins of pits associated with angling. Management agreements and enforcement to address.	+		
Vegetation succession	1	Lack of reedbed management leading to scrub encroachment. Management agreement to address.	+		
Water diversion for irrigation/domestic/industrial use	1	Abstraction causes reduced freshwater input. Review of consents well advanced but not yet implemented.	+	+	
Overfishing	2	Substantial lamprey by-catch in eel nets in River Ouse.		+	
Pollution – domestic sewage	1	Reduced dissolved oxygen in River Ouse is a barrier to fish migration. Review of consents well advanced but not yet implemented.	+	+	+
Pollution – agricultural fertilisers	1	Reduced dissolved oxygen in River Ouse is a barrier to fish migration. To be addressed through Catchment Sensitive Farming Initiatives and implementation of Water Framework Directive.	+	+	+
Recreational/tourism disturbance (unspecified)	1	Particularly illegal access by motorised recreational vehicles and craft. Control through management scheme.	+		

Other factor	1	Coastal squeeze causing loss of intertidal habitats and saltmarsh due to sea level rise and fixed defences. The Humber Flood Risk Management Strategy has been developed and is being implemented.	+		+

For category 2 factors only.

What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors?
Overfishing - Overfishing – to be considered through an ‘in-combination’ assessment of possible factors as part of the Review of Consents exercise.

Is the site subject to adverse ecological change? YES

27. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

Conservation measure	On-site	Off-site
Site/ Area of Special Scientific Interest (SSSI/ASSI)	+	+
National Nature Reserve (NNR)	+	
Special Protection Area (SPA)	+	
Land owned by a non-governmental organisation for nature conservation	+	+
Management agreement	+	+
Site management statement/plan implemented	+	
Area of Outstanding National Beauty (AONB)		+
Special Area of Conservation (SAC)	+	
IUCN (1994) category IV	+	

b) Describe any other current management practices:

The management of Ramsar sites in the UK is determined by either a formal management plan or through other management planning processes, and is overseen by the relevant statutory conservation agency. Details of the precise management practises are given in these documents.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

No information available

29. Current scientific research and facilities:

e.g. details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Fauna.

Numbers of migratory and wintering wildfowl and waders are monitored annually as part of the national Wetland Birds Survey (WeBS) organised by the British Trust for Ornithology, Wildfowl & Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee.

Seal populations are monitored by the Sea Mammal Research Unit

Humber Wader Ringing Group

Spurn Bird Observatory

National Nature Reserve monitoring

Environment.

Institute of Estuarine & Coastal Studies, Hull: various
 Industrial Concerns: monitoring on behalf of companies such as Associated British Ports and BP
 Environment Agency monitoring: various
 Geomorphological studies associated with shoreline management planning
 National Nature Reserve monitoring

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitor centre, observation hides and nature trails, information booklets, facilities for school visits, etc.
 There are a four National Nature Reserves with associated facilities within the Ramsar site (Spurn, Far Ings, Donna Nook and Saltfleetby – Theddlethorpe Dunes) and a number of other visitor, information and/or education centres including the Spurn Bird Observatory, the Cleethorpes Discovery Centre, Water’s Edge and Far Ings. A wide range of Humber wide and area-specific information is available through a range of media (eg leaflets, displays, internet etc) including ‘Humber Estuary European Marine Site Codes of Conduct’ developed with a range of stakeholders to cover a range of recreational and educational activities and ‘Coastal Futures’ – a partnership project working with local communities affected by flood risk and associated issues including managed realignment includes proactive education work within schools.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Activities, Facilities provided and Seasonality.

Sailing: marinas at Brough, Winteringham, Hull, Grimsby and South Ferriby.
 Bathing etc: Cleethorpes (some 6m visitors/yr).
 Walking/Horse riding: throughout
 Beach fishing, match sea-fishing, non-commercial bait digging.
 Non-commercial samphire collection
 Wildfowling
 Tourist amusements: Cleethorpes.
 Bird watching: throughout but particularly at Blacktoft Sands RSPB reserve and the four National Nature Reserves.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept. of Agriculture/Dept. of Environment, etc.
 Head, Natura 2000 and Ramsar Team, Department for Environment, Food and Rural Affairs,
 European Wildlife Division, Zone 1/07, Temple Quay House, 2 The Square, Temple Quay, Bristol,
 BS1 6EB

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Site Designations Manager, English Nature, Sites and Surveillance Team, Northminster House,
 Northminster Road, Peterborough, PE1 1UA, UK

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

Site-relevant references

Site-relevant references

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STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [REDACTED]

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0012915
SITENAME Thorne Moor

TABLE OF CONTENTS

- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0012915	Back to top
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1.3 Site name

Thorne Moor

1.4 First Compilation date 1995-06	1.5 Update date 2015-12
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1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee

Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough
PE1 1JY

Email:

Date site proposed as SCI: 1995-06

Date site confirmed as SCI: 2004-12

Date site designated as SAC: 2005-04

National legal reference of SAC designation:

Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010
(<http://www.legislation.gov.uk/uksi/2010/490/contents/made>).

2. SITE LOCATION

[Back to top](#)

2.1 Site-centre location [decimal degrees]:

Longitude

-0.8975

Latitude

53.63833333

2.2 Area [ha]:

1911.02

2.3 Marine area [%]

0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code**Region Name**

UKE1	East Yorkshire and Northern Lincolnshire
UKE3	South Yorkshire

2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

[Back to top](#)

3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
7110B	X		95.55	0	M	D			
7120B			1815.47	0	G	A	B	C	A

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

4. SITE DESCRIPTION

[Back to top](#)

4.1 General site character

Habitat class	% Cover
N07	28.0
N16	13.0
N23	32.0
N08	19.0
N06	8.0
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: nutrient-poor,acidic,peat,clay,peat,acidic,nutrient-poor 2 Terrestrial: Geomorphology and landscape: floodplain,lowland,floodplain,lowland

4.2 Quality and importance

Degraded raised bogs still capable of natural regeneration for which this is considered to be one of the best areas in the United Kingdom.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	I01		B
H	J02		B
H	G05		I
H	H04		B
H	K02		I

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	A06		I
H	A02		I
H	A04		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

5.1 Designation types at national and regional level:

[Back to top](#)

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK01	54.4	UK04	100.0		

6. SITE MANAGEMENT

[Back to top](#)

6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/> Yes
<input type="checkbox"/> No, but in preparation
<input checked="" type="checkbox"/> No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [REDACTED] (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (<i>Spartinion maritimae</i>)	57
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with <i>Empetrum nigrum</i>	57
2150	Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>)	57
2160	Dunes with <i>Hippochaeris rhamnoides</i>	57
2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with <i>Juniperus</i> spp.	57
2330	Inland dunes with open <i>Corynephorus</i> and <i>Agrostis</i> grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	57
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscusae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, screes and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Scree, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name: Hatfield Moor
Unitary Authority/County: Doncaster, North Lincolnshire
SAC status: Designated on 1 April 2005
Grid reference: SE699057
SAC EU code: UK0030166
Area (ha): 1363.55
Component SSSI: Hatfield Moors SSSI

Site description:

Hatfield Moors is a remnant of an extensive lowland raised bog which once occupied the Humberhead levels. Hatfield is unique in having developed directly upon nutrient deficient gravels without an initial reed-swamp phase. Much of the bog has been cut for peat yet a restricted representative flora and fauna persists within a mosaic of mire and dry heath habitats beneath birch scrub. The mire communities are dominated by cottongrasses *Eriophorum vaginatum* and *E. angustifolium*, cross-leaved heath *Erica tetralix* and bog-mosses *Sphagnum* spp., but include locally rare species such as cranberry *Vaccinium oxycoccus*, bog myrtle *Myrica gale* and bog rosemary *Andromeda polifolia*.

Qualifying habitats: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- Degraded raised bogs still capable of natural regeneration

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0030166
Date of registration: 14 June 2005

On behalf of the Secretary of State for Environment, Food and Rural Affairs

EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Area (SPA)

Name: Thorne and Hatfield Moors

Unitary Authority/County: Doncaster, East Riding of Yorkshire and North Lincolnshire

Consultation proposal: Thorne, Crowle and Goole Moors Site of Special Scientific Interest (SSSI) and Hatfield Moors SSSI have been recommended as a Special Protection Area because of their European ornithological importance.

Boundary of SPA: See SPA map.

Size of SPA: The SPA covers an area of 2,449.2 ha.

European ornithological importance of the SPA: Thorne and Hatfield Moors SPA is of European importance because:

The site qualifies under **article 4.1** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of a species listed in Annex 1 in any season:

Annex 1 species	5 year peak mean 1993 & 1995 - 1998	% GB population
Nightjar <i>Caprimulgus europaeus</i>	66 pairs - breeding	1.9% GB

Non-qualifying species of interest

The site also supports small numbers (at non-qualifying levels) of other Annex 1 species: Hen Harrier *Circus cyaneus*, Merlin *Falco columbarius* and Short-eared Owl *Asio flammeus* hunt over the site in winter and at least one pair of Hobbies *Falco subbuteo* feed over the site in summer. Also notable are Nightingales *Luscinia megarhynchos* breeding at one of their most northerly regular sites in Britain.

Data sources

Limbert, M., Mitchell, R.D., & Rhodes, R.J. 1986. *Thorne Moors Birds & Man*. Doncaster & District Ornithological Society.

Morris, A., Burges, D., Fuller, R.J., Evans, A.D., & Smith, K.W. 1994. The status and distribution of Nightjars *Caprimulgus europaeus* in Britain in 1992. *Bird Study* **41**: 181-191.

Roworth, P.C. 1992. A common bird census on Thorne Moors National Nature Reserve, South Yorkshire - a relic cut-over raised mire. *The Naturalist* **117**: 5-18.

Status of SPA

Thorne and Hatfield Moors was classified as a Special Protection Area on 16 August 2000.



Appendix C Conservation Objectives for the Relevant European Sites

No conservation objectives have been published for the Humber Estuary Ramsar site so the assessment defers to the conservation objectives published for the Humber Estuary SAC and SPA given these address the relevant qualifying features.

European Site Conservation Objectives for Humber Estuary Special Protection Area Site Code: UK9006111



With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- **The extent and distribution of the habitats of the qualifying features**
- **The structure and function of the habitats of the qualifying features**
- **The supporting processes on which the habitats of the qualifying features rely**
- **The population of each of the qualifying features, and,**
- **The distribution of the qualifying features within the site.**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

- A021 *Botaurus stellaris*; Great bittern (Non-breeding)
 - A021 *Botaurus stellaris*; Great bittern (Breeding)
 - A048 *Tadorna tadorna*; Common shelduck (Non-breeding)
 - A081 *Circus aeruginosus*; Eurasian marsh harrier (Breeding)
 - A082 *Circus cyaneus*; Hen harrier (Non-breeding)
 - A132 *Recurvirostra avosetta*; Pied avocet (Non-breeding)
 - A132 *Recurvirostra avosetta*; Pied avocet (Breeding)
 - A140 *Pluvialis apricaria*; European golden plover (Non-breeding)
 - A143 *Calidris canutus*; Red knot (Non-breeding)
 - A149 *Calidris alpina alpina*; Dunlin (Non-breeding)
 - A151 *Philomachus pugnax*; Ruff (Non-breeding)
 - A156 *Limosa limosa islandica*; Black-tailed godwit (Non-breeding)
 - A157 *Limosa lapponica*; Bar-tailed godwit (Non-breeding)
 - A162 *Tringa totanus*; Common redshank (Non-breeding)
 - A195 *Sterna albifrons*; Little tern (Breeding)
- Waterbird assemblage

This is a European Marine Site

This SPA is a part of the Humber Estuary European Marine Site (EMS). These Conservation Objectives should be used in conjunction with the Conservation Advice document for the EMS. Natural England's formal Conservation Advice for European Marine Sites can be found via [GOV.UK](https://www.gov.uk).

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations'). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment' including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives, and the accompanying Supplementary Advice (where this is available), will also provide a framework to inform the management of the European Site and the prevention of deterioration of habitats and significant disturbance of its qualifying features

These Conservation Objectives are set for each bird feature for a [Special Protection Area \(SPA\)](#).

Where these objectives are being met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving the aims of the Wild Birds Directive.

Publication date: 21 February 2019 (version 4). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

European Site Conservation Objectives for Humber Estuary Special Area of Conservation Site Code: UK0030170



With regard to the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- **The extent and distribution of qualifying natural habitats and habitats of qualifying species**
- **The structure and function (including typical species) of qualifying natural habitats**
- **The structure and function of the habitats of qualifying species**
- **The supporting processes on which qualifying natural habitats and habitats of qualifying species rely**
- **The populations of qualifying species, and,**
- **The distribution of qualifying species within the site.**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H1110. Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks

H1130. Estuaries

H1140. Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats

H1150. Coastal lagoons*

H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand

H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)

H2110. Embryonic shifting dunes

H2120. Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); Shifting dunes with marram

H2130. Fixed dunes with herbaceous vegetation ("grey dunes"); Dune grassland*

H2160. Dunes with *Hippophae rhamnoides*; Dunes with sea-buckthorn

S1095. *Petromyzon marinus*; Sea lamprey

S1099. *Lampetra fluviatilis*; River lamprey

S1364. *Halichoerus grypus*; Grey seal

* denotes a priority natural habitat or species (supporting explanatory text on following page)

This is a European Marine Site

This site is a part of the Humber Estuary European Marine Site. These Conservation Objectives should be used in conjunction with the Conservation Advice document for the EMS. Natural England's formal Conservation Advice for European Marine Sites can be found via [GOV.UK](https://www.gov.uk).

* Priority natural habitats or species

Some of the natural habitats and species for which UK SACs have been selected are considered to be particular priorities for conservation at a European scale and are subject to special provisions in the Habitats Regulations. These priority natural habitats and species are denoted by an asterisk (*) in Annex I and II of the Habitats Directive. The term 'priority' is also used in other contexts, for example with reference to particular habitats or species that are prioritised in UK Biodiversity Action Plans. It is important to note however that these are not necessarily the priority natural habitats or species within the meaning of the Habitats Regulations.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the "Habitats Regulations"). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment', including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term 'favourable conservation status' is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 31 March 2014 to reflect the consolidation of the Habitats Regulations in 2017.

European Site Conservation Objectives for Thorne Moor Special Area of Conservation Site Code: UK0012915



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- **The extent and distribution of qualifying natural habitats**
- **The structure and function (including typical species) of qualifying natural habitats, and**
- **The supporting processes on which qualifying natural habitats rely**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H7120. Degraded raised bogs still capable of natural regeneration

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the “Habitats Regulations”). They must be considered when a competent authority is required to make a ‘Habitats Regulations Assessment’, including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term ‘favourable conservation status’ is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

European Site Conservation Objectives for Hatfield Moor Special Area of Conservation

Site code: UK0030166



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- **The extent and distribution of the qualifying natural habitat**
- **The structure and function (including typical species) of the qualifying natural habitat, and,**
- **The supporting processes on which the qualifying natural habitat rely**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H7120. Degraded raised bogs still capable of natural regeneration

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the “Habitats Regulations”). They must be considered when a competent authority is required to make a ‘Habitats Regulations Assessment’, including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term ‘favourable conservation status’ is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

European Site Conservation Objectives for Thorne and Hatfield Moors Special Protection Area Site Code: UK9005171



With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- **The extent and distribution of the habitats of the qualifying features**
- **The structure and function of the habitats of the qualifying features**
- **The supporting processes on which the habitats of the qualifying features rely**
- **The population of each of the qualifying features, and,**
- **The distribution of the qualifying features within the site.**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

A224 *Caprimulgus europaeus*; European nightjar (Breeding)

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations'). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment' including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives, and the accompanying Supplementary Advice (where this is available), will also provide a framework to inform the management of the European Site and the prevention of deterioration of habitats and significant disturbance of its qualifying features

These Conservation Objectives are set for each bird feature for a [Special Protection Area \(SPA\)](#).

Where these objectives are being met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving the aims of the Wild Birds Directive.

Publication date: 21 February 2019 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

Appendix D BTO Bird Data Report and Technical Note (issued to Natural England during the pre-Application consultation)

Purpose of this Technical Note

- 10.1.1. The purpose of this technical note [when issued during the pre-Application consultation with Natural England] is to provide further contextual information on the potential pathways for impacts on qualifying bird species of the Humber Estuary Special Protection Area (SPA) and Ramsar site (hereafter collectively referred to as the ‘Humber designations’) and to support discussion and agreement on the information to be provided with the Application.

Overview of the Keadby Next Generation Power Station

- 10.1.2. The Main Site for the Keadby Next Generation Power Station (KNGPS) is an area of species-poor grassland located (as shown on **Plate 1** below) between a National Grid substation to the immediate east, an artificial hill (the Keadby Ash Tip) vegetated with scrub, woodland and rough grassland to the immediate west, vacant previously developed land to the immediate south, and arable farmland used for growing cereal crops and the operational Keadby Wind Farm to the immediate north. The habitat context remains unchanged with that present at the time of the HRA for the preceding Keadby CCS Power Station DCO.



Plate 1 – Location of the Main Site (red box) and its landscape setting

- 10.1.3. The position of the Main Site is emphasised in this technical note as it will be the focus for construction activities and therefore is the location of the The Keadby Next Generation Power Station Project

activities with potential to generate the most noise and visual disturbance during construction i.e. it represents the worst case for purposes of impact assessment.

10.1.4. The operational phase of the Proposed Development is not considered further in this technical note, as the parameters remain consistent with the details submitted and agreed (without any requirements for mitigation) for the Keadby CCS Power Station DCO. Indeed, the Proposed Development is anticipated to produce less operational noise than the Keadby CCS Power Station.

10.1.5. At the closest points to the Main Site, the relevant designations are located as follows:

- Humber Estuary SPA – 9.8km north-east of the Main Site.
- Humber Estuary Ramsar site – coinciding with the River Trent 1.3km to the east of the Main Site.

Relevant Contextual Information

10.1.6. Planning guidance (Ministry of Housing, Communities and Local Government, Ministry of Housing, Communities & Local Government (2018 to 2021) and Department for Levelling Up, Housing and Communities, 2024) makes clear that:

ecological surveys should only be required: “*where clearly justified. Assessments should be proportionate to the nature and scale of development proposed and the likely impact on biodiversity*”.

10.1.7. Therefore the matters of relevance for agreement of next steps are:

- what the likely worst-case zone of influence for disturbance is based on the magnitude and extent of potential disturbance impacts. For the purposes of this technical note it is considered sufficient to focus on noise impacts; and
- whether there is a reasonable likelihood of qualifying bird species occurring within the potential zone of influence of construction activities.

10.1.8. To inform review of this, initial noise modelling has been completed and existing data on birds present within the affected landscape has been obtained and reviewed. The noise assessment summarised in more detail below based on the Preliminary Environmental Information (PEI) Report and some additional work (modelling of Eco 1 and Eco 2, see below) specifically for this technical note.

Results of the Noise Modelling

10.1.9. The initial noise modelling was undertaken for locations relevant to the understanding of potential impacts on human noise sensitive receptors

(NSR). These are the locations referred to within the ES. This included properties located in close proximity to the River Trent, in positions intermediate between the Main Site and the River Trent. These human NSR therefore provide representative data on the absolute noise levels likely to be experienced at the River Trent and therefore at the Humber Estuary Ramsar site.

10.1.10. The coverage of human NSR did not provide good coverage of farmland habitats that some (but not all, as explained below) qualifying bird species could utilise as foraging habitat. To address this, some additional modelling locations were defined for this technical note to screen the noise levels likely to be experienced within farmland habitats.

10.1.11. These human NSR (NSR 4 and 5) and ecological receptors (Eco 1 to 4) are illustrated below on **Plate 2**. The absolute noise levels obtained for these locations are summarised in **Table C1**.

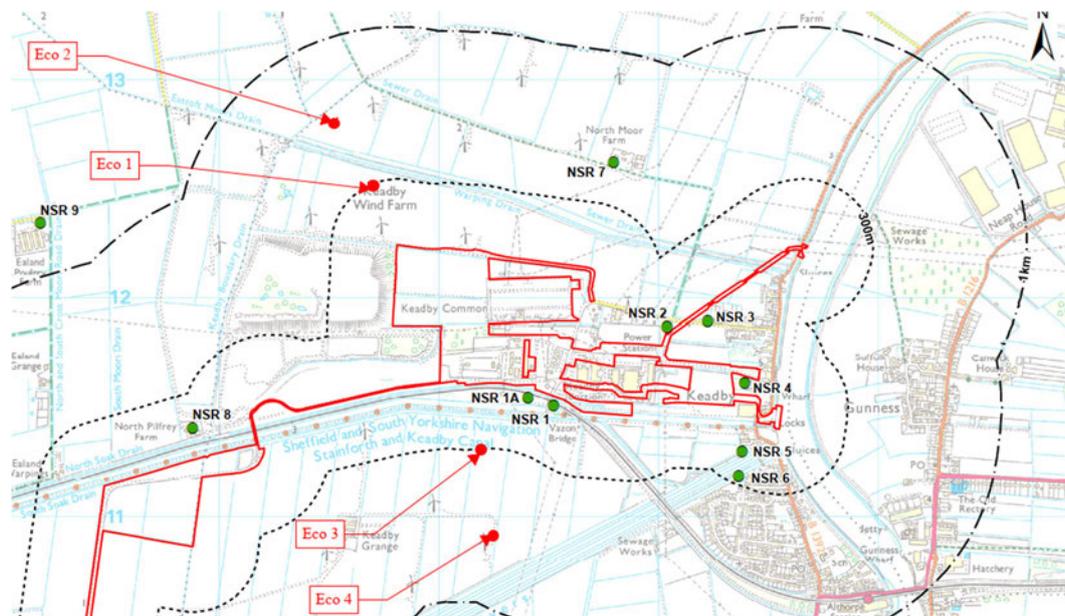


Plate 2 – Locations of the modelled NSR and ecological receptors

Table C1: Indicative free-field construction noise levels during daytime construction activity at locations representative of the River Trent and arable farmland (peak values for construction at the Main Site highlighted in yellow)

Receptor	Indicative free-field construction noise levels during daytime construction activity (dB $L_{Aeq,12h}$)				
	Site enabling and preparation	Main civil works (including piling and foundations)	Plant installation	Electrical connection construction	Canal water abstraction
NSR 3 - Keadby Village	44	49	48	41	48
NSR 4 - Mariners Arms Flats	42	47	46	39	48
Eco 1 (north of Main Site)	50	55	54	47	40
Eco 2 (north of Main Site)	45	50	49	42	37
Eco 3 (south of Main Site)	47	52	51	44	50
Eco 4 (south of Main Site)	42	47	46	39	46

10.1.12. The worst-case modelled absolute airborne noise level as a result of construction activities for the Main Site (i.e. the main civil engineering works) at NSR 4 (Mariners Arms Flats), a relatively quiet location adjacent to the banks of the River Trent, is 47dB which is predicted to occur during weekday daytime construction hours. The comparable value for NSR 3 (Keadby Village) is 49dB. These absolute noise levels are less than the baseline sound levels at NSR 3 and 4 (which are located between the Main Site and the River Trent) which is 51dB. Therefore construction noise

at the Main Site would be unlikely to be discernible at the River Trent from the existing baseline.

- 10.1.13. The baseline conditions at Eco 1 to 4 are already influenced by industrial noise because these locations coincide with the Keadby Wind Farm. The worst-case noise levels at 300m from (equating to, as apparent by comparing Plates 1 and 2, one arable field out from) construction activities for the Main Site would be 55dB over the arable fields to the north of the Main Site and 52dB over the arable fields to the south of the Main Site (Eco 1 and Eco 3 respectively). Thereafter, the worst-case absolute noise levels arising from construction activities at the Main Site decline rapidly with distance. Within two fields out from the Main Site, the predicted noise level is 50dB to the north of the Main Site and 47dB to the south of the Main Site (Eco 2 and 4 respectively).
- 10.1.14. Postlethwaite and Stephenson (2012)¹³ have reported evidence from a detailed measurement exercise on the disturbance effects on birds at Pyewipe mudflats (located within the Humber Estuary SPA) from percussive piling for the Grimsby River Terminal. This study found that noise levels from piling of less than 66dB produced no disturbance response from birds using the mudflats, whilst noise levels in the range of 66 to 83dB resulted in low level disturbance only (heads raised alert and temporarily stopping feeding, or roosting). Similarly, Cutts *et al.* (2009)¹⁴ concluded that regular construction noise at or below 50dB is not likely to result in an impact on birds.
- 10.1.15. Therefore, if the higher noise threshold (66dB) from Postlethwaite and Stephenson (2012) is applied then the noise levels from the Main Site over farmland would not be of sufficient magnitude to be likely to produce a disturbance effect on golden plover and lapwing using arable fields. If the lower threshold (50dB) is applied based on Cutts *et al.* (2009) then this indicates that the worst-case zone of influence for a potential noise impact on golden plover and lapwing using arable fields is restricted to a limited area up to two fields out from the Main Site and located within the existing disturbed setting of the Keadby Wind Farm.
- 10.1.16. Accordingly, an impact on the conservation status of qualifying bird species from construction noise is not likely to occur given the localised

¹³ Postlethwaite, B. and Stephenson, S. (2012) *Grimsby River Terminal Construction - Pile Noise Monitoring and Bird Behaviour Observations*. L-30062-S02-REPT-001. Xodus Group.

¹⁴ Cutts, N., Phelps, A. & Burdon, D. (2009) *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance*. Report to Humber INCA. ZBB710-F-2009. Institute of Estuarine and Coastal Studies University of Hull.

zone of influence relative to the total resource of comparable farmland habitat in the landscape around the Humber designations.

Existing Bird Data

Overview of the data used

- 10.1.17. This technical note utilises and summarises robust data obtained as a British Trust for Ornithology (BTO) Data Report, as appended in full to this technical note. The purpose of a BTO Data Report is to provide rigorous scientific information to inform fieldwork decisions and desk studies for Ecological Impact Assessment of potential development sites in the UK. The reports “*collate comprehensive and contemporary bird distribution and abundance data from BTO's high quality ornithological datasets to identify species associated with the site at different spatial scales, and to put these in wider contexts to identify key features.*”
- 10.1.18. The BTO Data Report is not relied on to determine the precise locations of birds; that is not reasonable for mobile species that could utilise habitats at the landscape scale. However, what it does provide (given the time series of data interrogated and the large size of the study area) is good evidence of those bird species that could reasonably be expected to occur within the affected landscape.
- 10.1.19. The BTO Data Report is based on datasets that in combination achieve moderate to very good coverage of the 10km study area in both the breeding and wintering seasons. This includes ‘timed effort survey’ data for grid squares that coincide directly with the Site, and for additional grid squares in the wider landscape (including squares located much closer to the Humber designations).
- 10.1.20. The data obtained has been filtered for interpretation in accordance with the following approach:
- the interpretation within the BTO Data Report for East Yorkshire and Southwest Yorkshire has been ignored. The Proposed Development is not within these areas, instead the BTO interpretation for Lincolnshire, North Lincolnshire and Yorkshire and the Humber covers the relevant area;
 - all datasets were considered together to identify all bird species that could occur irrespective of the age of the dataset concerned i.e. if a species has been recorded it is assumed that it could still occur. By so doing, the data interpretation reflects the worst-case scenario; and
 - all records of non-native bird species have been discounted as they are not relevant to the assessment.

Summary of the Data Obtained for the Breeding Season

- 10.1.21. The BTO Data Report identifies that the tetrads and 10km grid square within which the Site is located are not notable at the UK level for the

The Keadby Next Generation Power Station Project

abundance or presence of any populations of bird species during the breeding season. This includes the qualifying bird species of the Humber designations.

- 10.1.22. The tetrads and 10km grid square that coincides with the Proposed Development¹ are deemed to be notable at a national or regional level for the following 15 native species during the breeding season:
- At a national level for England and regional level for Yorkshire and the Humber – mute swan, stock dove, turtle dove, barn owl, skylark, Cetti’s warbler, sedge warbler, reed warbler, whitethroat, tree sparrow, yellow wagtail, corn bunting and reed bunting; and additionally
 - At a regional level for Lincolnshire and North Lincolnshire – goldcrest, spotted flycatcher.
- 10.1.23. None of the species named above are qualifying bird species of the Humber designations during the breeding season.
- 10.1.24. The available data therefore indicates that the 10km grid square within which the Proposed Development is located does not support notable numbers of any qualifying bird species during the breeding season.
- 10.1.25.** A summary of the status of the qualifying species relevant to the breeding season is provided below as **Table C2**.

Table C2: Status of Qualifying Bird Species in the Breeding Season

Qualifying breeding species	Status in the 10km grid square	Further comment ¹⁵
Great bittern	No records	No breeding or foraging habitat coinciding with the Proposed Development.
Eurasian marsh harrier	No records.	No breeding habitat coinciding with the Proposed Development. Negligible foraging habitat given the predominance of arable farmland.
Pied avocet	No records	No breeding habitat coinciding with the Proposed Development.

¹⁵ Informed by the BTO Bird facts website.

Qualifying breeding species	Status in the 10km grid square	Further comment ¹⁵
		No optimal foraging habitat.
Little tern	No records	No breeding habitat coinciding with the Proposed Development. Breeding focused in coastal areas and therefore most foraging is likely to be in marine zone and the main Estuary.

Summary of the Data Obtained for the Wintering and Passage Season

- 10.1.26. The BTO Data Report identifies that the tetrads and 10km grid square within which the Site is located are not notable at the UK level for the abundance or presence of any populations of bird species during the wintering/passage season. This includes the qualifying bird species of the Humber designations.
- 10.1.27. The tetrads and 10km grid square that coincides with the Proposed Development are deemed to be notable at a national or regional level for the following 12 species during the wintering/passage season:
- At a national level for England – mute swan, collared dove, common gull, marsh harrier, chiffchaff, tree sparrow, linnet, corn bunting and reed bunting; and additionally
 - At a regional level for Yorkshire and the Humber – green woodpecker; and additionally
 - At a county level for Lincolnshire and North Lincolnshire – nuthatch and stonechat.
- 10.1.28. None of the species named above are qualifying bird species of the Humber designations during the wintering and passage seasons. Whilst mute swan is a waterbird it is more typically associated with freshwater habitats so is not considered to be a qualifying bird species of the Humber designations.
- 10.1.29. The available data therefore indicates that the 10km grid square within which the Proposed Development is located does not support notable

number of any qualifying bird species during the wintering/passage season.

10.1.30. A summary of the status of the qualifying species relevant to the wintering/passage season is provided below as **Table C3**.

Table C3: Status of Qualifying Bird Species in the Wintering/Passage Season

Qualifying breeding species	Status in the 10km grid square	Further comment¹⁶
Great bittern	No records	No foraging habitat coinciding with the Proposed Development.
Hen harrier	No records	Sub-optimal foraging habitat coinciding with the Proposed Development – favours coastal marshes in winter, so will be focussed at the Humber Estuary and the Lincolnshire coast.
Pied avocet	No records	No foraging habitat coinciding with the Proposed Development – favours coastal marshes in winter, so will be focussed at the Humber Estuary.
Shelduck	No records	Sub-optimal foraging habitat coinciding with the Proposed Development – favours muddy estuaries and coastal marshes in winter, so will be focussed at the Humber Estuary.
Red knot	No records	No foraging habitat coinciding with the Proposed Development – favours large estuaries in winter so will be focused at the Humber Estuary.
Golden plover	Present	Likely to make incidental or opportunistic use of the arable fields surrounding the Site, data indicates no elevated importance of the arable farmland in the 10km grid square relative to the wider landscape.
Dunlin	Present	Sub-optimal foraging habitat coinciding with the Proposed Development – primarily coastal in

¹⁶ Informed by the BTO Bird facts website.

Qualifying breeding species	Status in the 10km grid square	Further comment ¹⁶
		winter, so will be focussed at the Humber Estuary.
Ruff	Present	Sub-optimal foraging habitat coinciding with the Proposed Development – favours marshes, making only incidental use of arable fields.
Black-tailed godwit	Present	Sub-optimal foraging habitat coinciding with the Proposed Development – favours muddy shorelines and wet grassland in winter, so will be focussed at the Humber Estuary. The former is negligible (tidal margins of the River Trent) and the latter absent.
Bar-tailed godwit	No records	Sub-optimal foraging habitat coinciding with the Proposed Development – favours muddy or sandy coastal substrates in winter, so will be focussed at the Humber Estuary.
Common redshank	Present	Foraging habitat coinciding with the Proposed Development is limited to the narrow strips of inter-tidal mud at the margins of the River Trent.
Non-breeding waterbird assemblage (other species)	Records were returned for: feral greylag goose, pink-footed goose, whooper swan, shoveler, gadwall, wigeon, mallard, teal, pochard, goldeneye, lapwing, grey plover, curlew, green sandpiper and great white egret.	Of the named species, the most likely to occur is lapwing given its association with arable farmland. The data indicates no elevated importance of the arable farmland in the 10km grid square relative to the wider landscape. Pink-footed goose will also use arable fields but the data records no notable occurrences of this species, and other information ¹⁷ clarifies that

¹⁷ Brides, K., Mitchell, C. & Hearn, R. (2013) *Mapping the distribution of feeding Pink-footed Geese in England*. A report to the Wildlife & Wetlands Trust and Natural England.

Qualifying breeding species	Status in the 10km grid square	Further comment ¹⁶
		<p>the land of functional importance to this species is located elsewhere and is linked to the locations of roosting sites.</p> <p>The other species would not typically utilise arable farmland and most are species of wetland habitats. There are no substantive areas of wetland habitats coinciding with the Site.</p>

Conclusion

10.1.31. The collated data indicates:

- There is no reasonable likelihood of most qualifying bird species occurring or being dependent on habitats within the zone of influence of construction activities at the Main Site. The likely exceptions to this are golden plover and lapwing;
- The worst-case temporary noise impact from construction of the Main Site will be limited in magnitude and extent, being focussed in an area between one and two fields out from the boundary of the Main Site within a landscape already influenced by the presence of Keadby Wind Farm; and
- Further, the findings of Postlethwaite and Stephenson (2012) indicate that construction works, including piling, at the Main Site is not likely to produce noise levels of sufficient magnitude to be likely to produce a disturbance effect on golden plover and lapwing using arable fields in the vicinity of the Main Site.

10.1.32. The available data therefore indicates that it would not be proportionate to require wintering bird surveys as the results are not reasonably necessary to review and assess the temporary construction impact of the Proposed Development on birds. As noted previously, there are also no likely operational pathways for impact so wintering bird surveys are also not needed to assess this phase.

10.1.33. This position is consistent with what was required for the recently consented Keadby CCS Power Station. The latter was consented, and its HRA agreed, without a requirement for wintering bird surveys. The Proposed Development has even less potential to affect qualifying bird

species compared with Keadby CCS Power Station as it does not require construction works within the River Trent.

[BTO Bird Data report](#)

10.1.34. The Bird Data Report is appended below.

Keadby

Compiled on 11 September 2024



SUMMARY

Background	The BTO Data Report collates and analyses comprehensive (2007–2011) and contemporary (2020–2024) bird data relating to the grid squares spanned by the site: 100 1-km squares, 25 tetrads and one 10-km square. For contextual analyses, data from these relevant squares are related to equivalent data from two vice-counties, two counties, one region, one country and the UK to assess species' importance in the vicinity of the site to help inform delivery of habitat mitigation, enhancement and biodiversity net gain.
Data used	Coverage of relevant squares spanned by the site from 2007–2011 is complete at the 10-km resolution and there is moderate coverage of the site by timed visits and very good coverage from casual recording in the breeding season (moderate and very good respectively in winter). Contemporary information for the period 2020–2024 is available from BirdTrack for 20% of tetrads (100% of 10-km squares) in the breeding season and from one BBS square.
Results	<p>During 2007–2011, 85 species with breeding evidence and 91 species in winter were recorded in the vicinity of the site at various spatial scales. Breeding season figures include eight Schedule 1 species, five Annex 1 species and 20 BoCC Red list species. The following rare breeding birds were recorded in the same 20-km or 50-km squares as the site during 2007–2011: Crane. For confidentiality reasons we cannot reveal fine-scale association with the site: further details may be available from the Rare Breeding Birds Panel.</p> <p>During the breeding seasons of 2020–2024, 84 species were recorded in the vicinity of the site at various spatial scales. These included seven Schedule 1 species, five Annex 1 species and 17 BoCC Red list species.</p> <p>In a regional context, the site's 10-km squares accounted for up to 69% of regional population size. Thirty-three species were notable in at least one region or season. In a county context, the site's 10-km squares accounted for up to 100% of county population size. Thirty-three species were notable in at least one county or season. In a vice-county context, the site's 10-km squares accounted for up to 100% of vice-county population size. Thirty-eight species were notable in at least one vice-county or season. Full details of notable species and those showing more positive population trends in the vicinity of the site compared to the wider context are given in the Report.</p>

1. INTRODUCTION

The purpose of the BTO Data Report is to provide information on bird species associated with potential development sites at a range of spatial scales to inform desk studies for ecological impact assessments. The Report uses BTO's long-term ornithological datasets, providing [high quality](#) comprehensive and contemporary information. BTO is grateful to the volunteers who collected all the data, and to the funders and scheme partners, who are listed in Section 3 under the relevant data sources.

The species list in this report can guide the need for detailed field surveys in conjunction with [Bird Survey Guidelines](#) advice. This Report highlights the legal and conservation status assigned to each species in the relevant country. Beyond simple species lists, BTO data are uniquely able to provide context to help quantify the importance of a site and its surroundings in conservation terms. This includes assessments of the percentage of county, regional and national geographic range and population size associated with the site, plus recent population changes, offering the potential to highlight priorities for delivering habitat mitigation, enhancement and biodiversity net gain.

All maps in this report use the maptiles R package (Giraud 2023) with basemap data copyright OpenStreetMap contributors.

2. SITE, SQUARES, REGIONS AND FEATURES

2.1 Relevant grid squares

Systematic bird recording in Britain and Ireland typically involves the collection of records for 1-km, 2-km ('tetrad') or 10-km squares, or using the boundaries of user-defined sites, nature reserves and other 'popular places'. Rarely can records be definitively attributed within the boundary of proposed development sites, especially small ones.

Unless otherwise stated, all species detailed in the BTO Data Report concern species present in grid squares *intersected* by the site boundary, rather than species that are definitively *within* the site boundary. Grid squares with at least 1ha overlapping the site are referred to as 'relevant' squares.

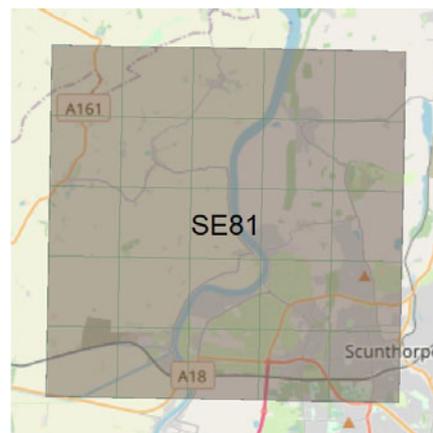
For example 'relevant tetrads' are all 2-km squares with at least 1ha overlapping the site. Data are summarised at the finest spatial scale possible, subject to the size of the site and the availability and spatial precision of BTO datasets in the vicinity of the site.

The number of relevant 1-km squares, tetrads and 10-km squares for the site are listed below. The map above shows the site in relation to relevant tetrads and relevant 10-km squares (for an equivalent map for 1-km squares, and for full lists of relevant 1-km squares, tetrads and 10-km squares, see Appendix 1).

- 100 relevant 1-km squares
- 25 relevant tetrads
- one relevant 10-km squares

For reasons of confidentiality the precise locations of certain rare breeding and wintering birds (typically those reported on by the [Rare Breeding Birds Panel](#)) cannot be revealed precisely in BTO Data Reports. For these species we follow the treatment introduced by *Bird Atlas 2007–11* where records were summarised for 20-km and 50-km squares. If any such rare breeding species have been recorded in the same 20-km or 50-km squares as the site, lists and maps of relevant 20-km and/or 50-km squares are included in Appendix 1.

All results in the BTO Data Report, especially those for larger grid resolutions, should be interpreted with respect to the habitats present on the site as some species listed may not occur within the site boundary.



2.2 Relevant county, regional and national contexts

The BTO Data Report contains contextual 'site importance' analyses that aim to highlight species for which the site and its relevant grid squares are important in local, regional, national and UK contexts. For example, does the site and its surroundings support a regionally significant population of a protected species?

National context concerns the site relative to the country it falls within. In addition to the UK (here combined with the Isle of Man and Channel Islands), the site also falls within one country: *England*.

Regional context concerns the site relative to the regions it falls within. For sites in England, regions are defined using the NUTS (Nomenclature of territorial units for statistics) level 1 regions. The following regions are relevant for this site: *Yorkshire and the Humber*.

County context concerns the site relative to counties. The following counties are relevant for this site: *East Riding of Yorkshire and Lincolnshire*.

Vice-county context concerns the site relative to vice-counties. For sites in Great Britain, the Report uses Watsonian Vice-counties. The following vice-counties are relevant for this site: *North Lincolnshire and South-west Yorkshire*.

Maps of all these areas can be found in Appendix 1. The grid squares associated with each of these area are used to determine overall range size and abundance at county, regional and national scales with which range size and abundance for the site's relevant grid squares can be calculated. Note that some individual grid squares may be associated with more than one geographical area. For more information see Section 5.

2.3 Relevant features

The BTO Data Report summarises species occurrence and abundance for species of conservation and statutory importance. In addition to the lists of species important across the UK, certain lists are of relevance in the UK's devolved administrations. The table below lists all species lists relevant for UK, Isle of Man and Channel Islands and England. Section 4 summarises the number of species recorded at or around the site for each of these feature lists.

Feature	Description
Schedule 1 UK	Species listed on Schedule 1 of the Wildlife and Countryside Act 1981
BoCC Red	Species on the Red list according to Birds of Conservation Concern 5 (Stanbury et al. 2021)
BoCC Amber	Species on the Amber list, according to Birds of Conservation Concern 5 (Stanbury et al. 2021)
Annex 1	Species on Annex 1 of the EU Birds Directive
IUCN2 Critically Endangered	Species listed as Critically endangered in Great Britain (Stanbury et al. 2021)
IUCN2 Endangered	Species listed as Endangered in Great Britain (Stanbury et al. 2021)
IUCN2 Near Threatened	Species listed as Near Threatened in Great Britain (Stanbury et al. 2021)
IUCN2 Vulnerable	Species listed as Vulnerable in Great Britain (Stanbury et al. 2021)
RBBP	Rare and scarce species considered by the Rare Breeding Birds Panel
Section 41 England	Species listed in Section 41 of the Natural Environment and Rural Communities Act 2006 (England only)
Schedule ZA1 England & Wales	Species listed on Schedule ZA1 of the Wildlife and Countryside Act (England & Wales only)

3. DATA SOURCES AND COVERAGE

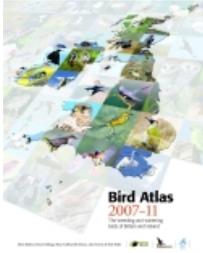
The BTO Data Report uses comprehensive atlas distribution data from 2007–11 to give a baseline of high-quality information about species status at and around the site and in the wider context. This is supplemented by the latest records from current schemes, including BirdTrack and BBS. The report considers **269 species** that regularly occur in Britain and Ireland. These include **221 breeding species** and **226 wintering species**. The report includes BOU Category C established non-native species but excludes exotic non-native species (i.e. those without self-sustaining populations). Breeding species are defined as those that were recorded with confirmed breeding evidence in at least one 10-km square in Britain or Ireland in *Bird Atlas 2007–11*. Wintering species are defined as those recorded in at least fifty 10-km squares in *Bird Atlas 2007–11*, plus six rare residents that the 50-square rule excluded (e.g. Cirl Bunting). Species on statutory and conservation status lists, such as Schedule 1, Birds of Conservation Concern 5, or Section 7 (Wales) are highlighted. Some lists consider subspecies or populations (e.g. Greenland White-fronted Goose, Hebridean Song Thrush) for which BTO data are not ideally suited. We therefore include the parent species in these analyses to ensure appropriate warnings are raised and dedicated surveys may be required.

Systematic bird recording often involves the assignment of 'breeding evidence' to records. Breeding evidence is hierarchical, having three levels: possible breeding, probable breeding and confirmed breeding. These are directly inferred from field observations and indicate the certainty that can be ascribed to the record that breeding is taking place at a location. For example, a bird singing in suitable territory is assigned possible breeding evidence, a bird carrying nesting material is assigned probable breeding evidence, whereas recently fledged young amounts to confirmed breeding evidence. Lack of breeding evidence (i.e. simple presence) can reflect either that the observer did not witness appropriate behaviours indicative of breeding, or that submission of breeding evidence was not mandatory for that particular data source.

Lack of breeding evidence in the data should not be assumed to indicate lack of breeding.

See below for details about each dataset and an assessment of the quantity of data relating to the site and its relevant grid squares.

3.1 Comprehensive species assessment 2007–2011

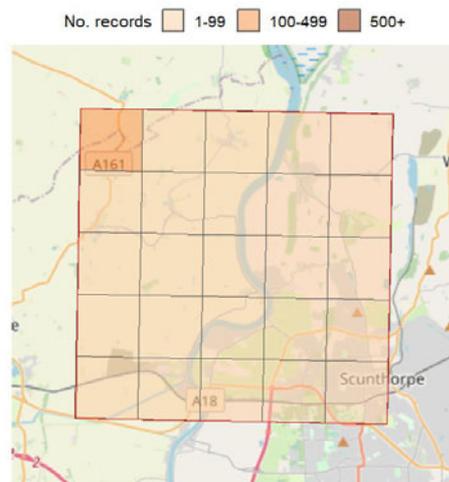


Bird Atlas 2007–11 (BTO, BirdWatch Ireland and the Scottish Ornithologists' Club) provides data at two resolutions: complete 10-km distribution datasets and sample 2-km distribution and relative abundance datasets. Although the Bird Atlas data are now 13 years old, they still provide the most recent and comprehensive assessment of bird distributions available. **All one relevant 10-km square** that the site spans will have been surveyed in winter and the breeding season to provide 10-km resolution distribution information. Unstructured data (i.e. casual records) at tetrad resolution were provided for **21 relevant tetrads** in the breeding season and for **12 relevant tetrads** in winter. The total numbers of records submitted across this set of tetrads in the breeding season and winter were **524 records** and **158 records** respectively.

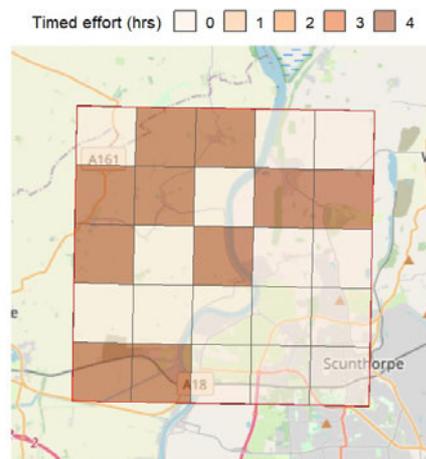
Additionally, at least 32% of tetrads in each 10-km square received timed visits, amounting to structured data for 50089 tetrads across Britain and Ireland. Of the 25 relevant tetrads that the site spans, **10 (40%)** received Timed Tetrad Visits in the breeding season (40 hours of recording effort). Similarly, **11 tetrads (40%)** were visited in winter (41 hours).

Data quality control: All records have been manually verified prior to use.

Distribution of casual records (breeding)



Distribution of timed effort (breeding)



3.2 Contemporary species assessment 2020-2024

The current species assessment is based on the following data sources.

3.2.1 Breeding Bird Survey



The UK *Breeding Bird Survey* (BBS hereafter; BTO, JNCC, RSPB) is an annual survey of over 4000 randomly selected 1-km squares across the UK. Each square is surveyed twice per breeding season, providing up to date records of bird occurrence in this c.3% sample of the UK. The BBS does not require observers to provide breeding evidence information. Consequently, all records relate to presence information; *it should not be assumed that lack of breeding evidence means species were not breeding at or near the site*. This Report queries data from the 4900 1-km squares surveyed for the BBS during 2017–2020. Only **one** of the relevant 1-km squares was also a BBS square (SE8118). That square was surveyed for one year, most recently in **2017**.

Data quality control: All records have been manually verified prior to use.

3.2.2 BirdTrack



BirdTrack (BTO, RSPB, BirdWatch Ireland, Scottish Ornithologists' Club and Welsh Ornithological Society) provides information on recent sightings of birds throughout Britain and Ireland. Unlike *Bird Atlas*, which has a structured component ensuring complete coverage of 10-km squares, *BirdTrack* is unstructured and coverage is strongly associated with the distribution and birdwatching preferences of observers. The consequent variation in recording effort means that for some areas there be less information to generate a report. A further difference from *Bird Atlas* is that observers are not required to provide breeding evidence information. Consequently, some searches may yield only presence information; it should not be assumed that lack of breeding evidence means species were not breeding at or near the site. Observers are free to birdwatch where they choose, and can provide records with varying levels of spatial precision, from pin-pointed records, to large polygons that may span multiple grid squares. The assessment includes data for the breeding season (March–July inclusive) and non-breeding season (August–February inclusive) for the last five years and is summarised with respect to the relevant grid squares, summarising records to the finest spatial precision that the records permit.

BirdTrack data were available for **20%** of the site's relevant tetrads in the breeding season (100% of 10-km squares), including data from **2024**. Data were available for **20%** of the site's relevant tetrads in winter (100% of 10-km squares), including data from **2024**.

Data quality control: Observers are warned of 'threshold breaking' records at the point of data entry (unusual place or date for a species; unusually high count) and given the opportunity to correct mistakes. Further manual verification occurs but as BirdTrack data are 'live', the verification status of individual records varies. Rejected records and any in an active state of query are excluded from the Report.

4. SPECIES LISTS

4.1 Species assessment 2007–2011

This section summarises comprehensive *Bird Atlas 2007–11* distribution data for the 25 relevant tetrads and one relevant 10-km square the site spans. It also considers data from the one relevant 20-km square and one relevant 50-km square for any confidential RBBP species records.

4.1.1 Breeding season

Bird Atlas 2007–11 indicate **85 species** with breeding evidence in the vicinity of the site at a range of spatial resolutions (Table 1). At the highest level of spatial resolution achievable with Bird Atlas data, 80 species were recorded with breeding evidence in the site’s relevant tetrads. The following confidential species were recorded with breeding evidence during 2007–11 in the same 50-km square(s) as the site: Crane. See Appendix 3 for the full list of species with breeding evidence recorded in the vicinity of the site.

Table 1. Numbers of species in the breeding season recorded during 2007–11 at different spatial resolutions relative to the site. Rows give figures for all species, and according to various lists of important features. Columns indicate status in relevant grid squares of different sizes.

Species category	2-km	10-km	20-km	50-km
All species	80	4	0	1
Annex 1	1	3	0	1
BoCC Amber	21	2	0	1
BoCC Red	20	0	0	0
IUCN2 Critically Endangered	1	0	0	0
IUCN2 Endangered	7	0	0	0
IUCN2 Near Threatened	10	1	0	0
IUCN2 Vulnerable	12	1	0	1
RBBP	5	4	0	1
Schedule 1 UK	4	4	0	0
Schedule ZA1 England & Wales	0	0	0	0
Section 41 England	19	1	0	0

4.1.2 Winter

Bird Atlas 2007–11 indicates **91 species** were recorded in the vicinity of the site in winter at a range of spatial resolutions (Table 2). At the highest level of spatial resolution achievable with Bird Atlas data, 87 species were recorded in winter in the site’s relevant tetrads. No confidential species were recorded in winter in any of the site’s relevant 20-km or 50-km squares. See Appendix 3 for the full list of species recorded in the vicinity of the site.

Table 2. Numbers of species in winter during 2007–11 at different spatial resolutions relative to the site. Rows give figures for all species, and according to various lists of important features. Columns indicate status in relevant grid squares of different sizes.

Species category	2-km	10-km	20-km	50-km
All species	87	4	0	0
Annex 1	5	1	0	0
BoCC Amber	26	1	0	0
BoCC Red	19	1	0	0
IUCN2 Critically Endangered	3	0	0	0
IUCN2 Endangered	10	0	0	0
IUCN2 Near Threatened	8	0	0	0
IUCN2 Vulnerable	16	1	0	0
RBBP	11	1	0	0
Schedule 1 UK	11	2	0	0
Schedule ZA1 England & Wales	0	0	0	0
Section 41 England	17	0	0	0

4.2 Species assessment 2020-2024

4.2.1 Breeding season

The assessment of current species associated with the site in the breeding season is based on BBS and BirdTrack. This information summarises species with and without breeding evidence as (unlike Bird Atlas data) these data sources do not require evidence to be submitted. These sources indicate **84 species** recorded in the vicinity of the site in the breeding season at a range of spatial resolutions (Table 3). At the highest level of spatial resolution achievable with these data, 21 species were recorded in the same 1-km square(s) as the site. Some BirdTrack sites spanned 10-km square boundaries; any species associated with these BirdTrack sites and not present at a finer resolution are summarised in the '>10-km' column. Particular care should be taken with such records as the species could have been recorded some distance from the site. See Appendix 4 for the full list of species recorded in the vicinity of the site during 2020-2024.

Table 3. Numbers of species in the breeding season during 2020-2024 at different spatial resolutions relative to the site. Rows give figures for all species, and according to various lists of important features. Columns indicate status in relevant grid squares of different sizes.

Species category	1-km	2-km	10-km	>10-km
All species	21	29	5	29
Annex 1	0	0	0	5
BoCC Amber	9	8	3	10
BoCC Red	5	6	1	5
IUCN2 Critically Endangered	0	1	0	1
IUCN2 Endangered	1	3	0	2
IUCN2 Near Threatened	3	4	1	4
IUCN2 Vulnerable	3	5	1	5
RBBP	0	1	0	6
Schedule 1 UK	0	1	0	6
Schedule ZA1 England & Wales	0	0	0	1
Section 41 England	6	5	0	6

4.2.2 Non-breeding season

The assessment of current species associated with the site is based on BirdTrack and indicate **102 species** recorded in the vicinity of the site in the non-breeding season at a range of spatial resolutions (Table 4). Some BirdTrack sites spanned 10-km square boundaries; any species associated with these BirdTrack sites and not present at a finer resolution are summarised in the '>10-km' column. Particular care should be taken with such records as the species could have been recorded some distance from the site. See Appendix 4 for the full list of species recorded in the vicinity of the site during 2020-2024.

Table 4. Numbers of species in the non-breeding season during 2020-2024 at different spatial resolutions relative to the site. Rows give figures for all species, and according to various lists of important features. Columns indicate status in relevant grid squares of different sizes.

Species category	1-km	2-km	10-km	>10-km
All species	0	79	2	21
Annex 1	0	8	0	1
BoCC Amber	0	31	0	9
BoCC Red	0	18	1	2
IUCN2 Critically Endangered	0	5	0	0
IUCN2 Endangered	0	8	0	4
IUCN2 Near Threatened	0	5	1	2
IUCN2 Vulnerable	0	19	0	1
RBBP	0	17	0	5
Schedule 1 UK	0	10	0	3
Schedule ZA1 England & Wales	0	0	0	0
Section 41 England	0	13	1	1

5. SITE IMPORTANCE

A site may be important if it supports a high proportion of a species' local, regional or national population, or if its population trends are more positive at the site compared to elsewhere. Whilst data are not available at sufficiently fine scales to assess the site itself (see Section 2), here we used *Bird Atlas 2007–11* distribution and relative abundance data for relevant 10-km squares to assess the area in which the site falls.

For each species we express its range and population size in the vicinity of the site relative to the total range size and population size in different geographic contexts, ranging from vice-counties and counties, through regions, to countries. This requires determining how many of the relevant 10-km squares spanned by the site are occupied (e.g. one) and how many 10-km squares in the larger region are occupied (e.g. 20); in this case the site and its vicinity account for 5% (= 1/20) of the species' range in the region. As large sites will tend to account for a higher percentage of range than small sites, such figures need to be bench-marked to allow comparability across sites. This requires knowing how many of the site's relevant 10-km squares fall in the region (e.g. one) and the total number of 10-km squares in the region (e.g. 100); in this case the site's 'percentage size' is 1% (= 1/100). We define **Notable species** as those for which the percentage range is at least twice the site's percentage size. In the above examples the percentage range (5%) is more than double the site's percentage size (1%) so the species would be highlighted as Notable. The exception to this rule is at the scale of United Kingdom where we mark species as **Notable** if the site and vicinity account for 2% or more of the species' UK range.

Distribution data are available for all species for the above analysis. However, distribution data ignore the fact that some species vary widely in abundance within their range. Therefore, to supplement the results above, we undertake a similar exercise using relative abundance data which can help to highlight species for which the site and its vicinity is a particular hot-spot of locally, regionally or nationally high density. *Bird Atlas 2007–11* data give a relative density measure for each terrestrial species in each 10-km square (**colonial seabirds are excluded**). These can be summarised in the same way as distribution data to estimate the percentage of the region's population size found at the site and its vicinity. Calculations of percentages and derivation of Notable species are as above.

Lastly, breeding season relative abundance data are available for two periods, 1988–91 and 2008–11, allowing for an assessment of relative abundance change for terrestrial bird species over this interval for the site and its vicinity (**colonial seabirds are excluded**). By comparing such values with corresponding change measures for the wider region we can identify species for which the site and its vicinity has had more positive population trends (i.e. increasing more than elsewhere, or declining less). This may indicate that the 10-km squares in which the site falls are an important refuge for these species in a local, regional or national context. When interpreted alongside the species lists in Section 4 and the result of any commissioned field surveys, these results can help to identify species for which the site may be particularly important. For very small sites spanning only a single 10-km square these results should be interpreted with caution.

It is important to remember that all these calculations use 10-km resolution data so relate to the site and its vicinity, not strictly to the site alone.

5.1 Country: UK, Isle of Man and Channel Islands

Overall, one of the 10-km squares that include the site fall in UK, Isle of Man and Channel Islands, accounting for 0.033% of 10-km squares in UK, Isle of Man and Channel Islands. According to *Bird Atlas* data, these squares support between 0% and 1.2% of the geographic range in UK, Isle of Man and Channel Islands of all the species considered (breeding and winter combined). In terms of abundance, these squares represent between 0% and 1.1% of the total population size in UK, Isle of Man and Channel Islands. In the context of the United Kingdom, **notable species** are defined as those for which the site's relevant 10-km squares account for at least 2% of geographic range in the UK. If any species qualify they are listed below, with those on the **BoCC Red List** and **BoCC Amber List** highlighted in corresponding colour:

- Breeding range, zero species:
- Winter range, zero species:
- Breeding abundance, zero species:
- Winter abundance, zero species:

Between 1988–91 and 2008–11, there were 26 species for which relative abundance increased more (or decreased less) at/near the site compared to the relative abundance changes apparent across the rest of UK, Isle of Man and Channel Islands. The ten species with the most positive difference in trend between site and region are listed below and all species can be seen in Figure 5.1 in Appendix 5.

- Mute Swan, **Mallard**, **Stock Dove**, **Moorhen**, Lesser Whitethroat, **Whitethroat**, **Yellow Wagtail**, Pied/White Wagtail, **Corn Bunting**, **Reed Bunting**

There were 53 species for which the opposite was the case, i.e. that they were declining more (or increasing less) at/near the site compared to the rest of UK, Isle of Man and Channel Islands. The ten species with the most negative difference in trend between site and region were:

- **Turtle Dove**, **Lapwing**, **Snipe**, Jay, **Rook**, Coal Tit, **Willow Tit**, Great Tit, Chiffchaff, **Bullfinch**

5.2 Country: England

Overall, one of the 10-km squares that include the site fall in England, accounting for 0.067% of 10-km squares in England. According to *Bird Atlas* data, these squares support between 0.1% and 1.3% of the geographic range in England of all the species considered (breeding and winter combined). In terms of abundance, these squares represent between 0% and 1.2% of the total population size in England. **Notable species** for England are listed below, with those on the **BoCC Red List** and **BoCC Amber List** highlighted in corresponding colour:

- Breeding range, 12 species: **Shelduck**, **Shoveler**, **Pochard**, **Quail**, **Turtle Dove**, **Bittern**, **Marsh Harrier**, Peregrine, **Willow Tit**, Cetti's Warbler, **Tree Sparrow**, **Corn Bunting**
- Winter range, nine species: **Whooper Swan**, **Ringed Plover**, **Redshank**, **Marsh Harrier**, **Willow Tit**, Cetti's Warbler, Firecrest, **Snow Bunting**, **Corn Bunting**
- Breeding abundance, 13 species: Mute Swan, **Stock Dove**, **Turtle Dove**, Barn Owl, **Skylark**, Cetti's Warbler, **Sedge Warbler**, Reed Warbler, **Whitethroat**, **Tree Sparrow**, **Yellow Wagtail**, **Corn Bunting**, **Reed Bunting**
- Winter abundance, nine species: Mute Swan, Collared Dove, **Common Gull**, **Marsh Harrier**, Chiffchaff, **Tree Sparrow**, **Linnet**, **Corn Bunting**, **Reed Bunting**

Between 1988–91 and 2008–11, there were 29 species for which relative abundance increased more (or decreased less) at/near the site compared to the relative abundance changes apparent across the rest of England. The ten species with the most positive difference in trend between site and region are listed below and all species can be seen in Figure 5.2 in Appendix 5.

- Mute Swan, **Mallard**, **Stock Dove**, **Moorhen**, **House Martin**, Lesser Whitethroat, **Whitethroat**, **Yellow Wagtail**, Pied/White Wagtail, **Corn Bunting**

There were 50 species for which the opposite was the case, i.e. that they were declining more (or increasing less) at/near the site compared to the rest of England. The ten species with the most negative difference in trend between site and region were:

- **Turtle Dove**, **Lapwing**, **Snipe**, Green Woodpecker, Jay, **Rook**, Coal Tit, **Willow Tit**, Chiffchaff, **Bullfinch**

5.3 Region: Yorkshire and the Humber

Overall, one of the 10-km squares that include the site fall in Yorkshire and the Humber, accounting for 0.51% of 10-km squares in Yorkshire and the Humber. According to *Bird Atlas* data, these squares support between 0.5% and 10% of the geographic range in Yorkshire and the Humber of all the species considered (breeding and winter combined). In terms of abundance, these squares represent between 0% and 68.7% of the total population size in Yorkshire and the Humber. **Notable species** for Yorkshire and the Humber are listed below, with those on the **BoCC Red List** and **BoCC Amber List** highlighted in corresponding colour:

- Breeding range, 14 species: **Shelduck**, **Shoveler**, **Pochard**, **Quail**, **Turtle Dove**, Great Crested Grebe, **Bittern**, **Marsh Harrier**, Hobby, Peregrine, **Willow Tit**, Cetti's Warbler, Reed Warbler, **Corn Bunting**
- Winter range, nine species: **Ringed Plover**, **Green Sandpiper**, **Marsh Harrier**, Cetti's Warbler, Chiffchaff, Blackcap, Firecrest, **Snow Bunting**, **Corn Bunting**
- Breeding abundance, 13 species: Mute Swan, **Stock Dove**, **Turtle Dove**, Barn Owl, **Skylark**, Cetti's Warbler, **Sedge Warbler**, Reed Warbler, **Whitethroat**, **Tree Sparrow**, **Yellow Wagtail**, **Corn Bunting**, **Reed Bunting**
- Winter abundance, nine species: Mute Swan, Collared Dove, **Marsh Harrier**, Green Woodpecker, Chiffchaff, Stonechat, **Linnet**, **Corn Bunting**, **Reed Bunting**

Between 1988–91 and 2008–11, there were 29 species for which relative abundance increased more (or decreased less) at/near the site compared to the relative abundance changes apparent across the rest of Yorkshire and the Humber. The ten species with the most positive difference in trend between site and region are listed below and all species can be seen in Figure 5.3 in Appendix 5.

- Mute Swan, **Mallard**, Red-legged Partridge, **Stock Dove**, Great Spotted Woodpecker, **House Martin**, **Whitethroat**, **Yellow Wagtail**, Pied/White Wagtail, **Corn Bunting**

There were 50 species for which the opposite was the case, i.e. that they were declining more (or increasing less) at/near the site compared to the rest of Yorkshire and the Humber. The ten species with the most negative difference in trend between site and region were:

- **Turtle Dove**, **Lapwing**, **Snipe**, Jay, **Rook**, Coal Tit, **Willow Tit**, Great Tit, Chiffchaff, **Bullfinch**

5.4 County: East Riding of Yorkshire

Overall, one of the 10-km squares that include the site fall in East Riding of Yorkshire, accounting for 2.2% of 10-km squares in East Riding of Yorkshire. According to *Bird Atlas* data, these squares support between 2.3% and 25% of the geographic range in East Riding of Yorkshire of all the species considered (breeding and winter combined). In terms of abundance, these squares represent between 0% and 100% of the total population size in East Riding of Yorkshire. **Notable species** for East Riding of Yorkshire are listed below, with those on the **BoCC Red List** and **BoCC Amber List** highlighted in corresponding colour:

- Breeding range, 10 species: **Shoveler**, **Pochard**, Great Crested Grebe, **Bittern**, **Marsh Harrier**, Hobby, Peregrine, **Willow Tit**, Cetti's Warbler, Nuthatch
- Winter range, nine species: **Ringed Plover**, **Green Sandpiper**, **Marsh Harrier**, Cetti's Warbler, Chiffchaff, Blackcap, Firecrest, Nuthatch, **Snow Bunting**
- Breeding abundance, 13 species: Canada Goose, **Turtle Dove**, Barn Owl, Jay, Cetti's Warbler, **Sedge Warbler**, Reed Warbler, Goldcrest, Nuthatch, **Spotted Flycatcher**, **Yellow Wagtail**, **Corn Bunting**, **Reed Bunting**
- Winter abundance, nine species: Mute Swan, Collared Dove, **Marsh Harrier**, Green Woodpecker, Chiffchaff, Nuthatch, Stonechat, **Corn Bunting**, **Reed Bunting**

Between 1988–91 and 2008–11, there were 25 species for which relative abundance increased more (or decreased less) at/near the site compared to the relative abundance changes apparent across the rest of East Riding of Yorkshire. The ten species with the most positive difference in trend between site and region are listed below and all species can be seen in Figure 5.4 in Appendix 5.

- Mute Swan, **Mallard**, Red-legged Partridge, **Stock Dove**, Great Spotted Woodpecker, **House Martin**, **Whitethroat**, **Yellow Wagtail**, Pied/White Wagtail, **Corn Bunting**

There were 53 species for which the opposite was the case, i.e. that they were declining more (or increasing less) at/near the site compared to the rest of East Riding of Yorkshire. The ten species with the most negative difference in trend between site and region were:

- Turtle Dove, Lapwing, Snipe, Jay, Coal Tit, Willow Tit, Great Tit, Chiffchaff, Mistle Thrush, Bullfinch

5.5 County: Lincolnshire

Overall, one of the 10-km squares that include the site fall in Lincolnshire, accounting for 1.1% of 10-km squares in Lincolnshire. According to *Bird Atlas* data, these squares support between 1.1% and 7.1% of the geographic range in Lincolnshire of all the species considered (breeding and winter combined). In terms of abundance, these squares represent between 0% and 40.7% of the total population size in Lincolnshire. **Notable species** for Lincolnshire are listed below, with those on the **BoCC Red List** and **BoCC Amber List** highlighted in corresponding colour:

- Breeding range, eight species: Shoveler, Pochard, Quail, Bittern, Peregrine, Willow Tit, Cetti's Warbler, Nuthatch
- Winter range, seven species: Ringed Plover, Cetti's Warbler, Chiffchaff, Blackcap, Firecrest, Nuthatch, Snow Bunting
- Breeding abundance, 11 species: Canada Goose, Turtle Dove, Barn Owl, Cetti's Warbler, Sedge Warbler, Goldcrest, Spotted Flycatcher, Tree Sparrow, Yellow Wagtail, Corn Bunting, Reed Bunting
- Winter abundance, seven species: Mute Swan, Marsh Harrier, Chiffchaff, Nuthatch, Stonechat, Corn Bunting, Reed Bunting

Between 1988–91 and 2008–11, there were 25 species for which relative abundance increased more (or decreased less) at/near the site compared to the relative abundance changes apparent across the rest of Lincolnshire. The ten species with the most positive difference in trend between site and region are listed below and all species can be seen in Figure 5.5 in Appendix 5.

- Mute Swan, Mallard, Red-legged Partridge, Stock Dove, Moorhen, Great Spotted Woodpecker, House Martin, Whitethroat, Yellow Wagtail, Corn Bunting

There were 54 species for which the opposite was the case, i.e. that they were declining more (or increasing less) at/near the site compared to the rest of Lincolnshire. The ten species with the most negative difference in trend between site and region were:

- Lapwing, Green Woodpecker, Jay, Rook, Coal Tit, Willow Tit, Great Tit, Chiffchaff, Mistle Thrush, Bullfinch

5.6 Vice-county: North Lincolnshire

Overall, one of the 10-km squares that include the site fall in North Lincolnshire, accounting for 1.6% of 10-km squares in North Lincolnshire. According to *Bird Atlas* data, these squares support between 1.7% and 12.5% of the geographic range in North Lincolnshire of all the species considered (breeding and winter combined). In terms of abundance, these squares represent between 0% and 55.2% of the total population size in North Lincolnshire. **Notable species** for North Lincolnshire are listed below, with those on the **BoCC Red List** and **BoCC Amber List** highlighted in corresponding colour:

- Breeding range, seven species: Shoveler, Pochard, Quail, Bittern, Peregrine, Cetti's Warbler, Nuthatch
- Winter range, six species: Ringed Plover, Cetti's Warbler, Blackcap, Firecrest, Nuthatch, Snow Bunting
- Breeding abundance, 11 species: Canada Goose, Turtle Dove, Barn Owl, Cetti's Warbler, Sedge Warbler, Reed Warbler, Goldcrest, Spotted Flycatcher, Tree Sparrow, Corn Bunting, Reed Bunting
- Winter abundance, seven species: Mute Swan, Marsh Harrier, Chiffchaff, Nuthatch, Stonechat, Corn Bunting, Reed Bunting

Between 1988–91 and 2008–11, there were 27 species for which relative abundance increased more (or decreased less) at/near the site compared to the relative abundance changes apparent across the rest of North Lincolnshire. The ten species with the most positive difference in trend between site and region are listed below and all species can be seen in Figure 5.6 in Appendix 5.

- Mute Swan, Mallard, Red-legged Partridge, Stock Dove, Moorhen, Great Spotted Woodpecker, House Martin, Whitethroat, Yellow Wagtail, Corn Bunting

There were 52 species for which the opposite was the case, i.e. that they were declining more (or increasing less) at/near the site compared to the rest of North Lincolnshire. The ten species with the most negative difference in trend between site and region were:

- Lapwing, Snipe, Jay, Rook, Coal Tit, Willow Tit, Great Tit, Chiffchaff, Mistle Thrush, Bullfinch

5.7 Vice-county: South-west Yorkshire

Overall, one of the 10-km squares that include the site fall in South-west Yorkshire, accounting for 1.9% of 10-km squares in South-west Yorkshire. According to *Bird Atlas* data, these squares support between 1.9% and 16.7% of the geographic range in South-west Yorkshire of all the species considered (breeding and winter combined). In terms of abundance, these squares represent between 0% and 100% of the total population size in South-west Yorkshire.

Notable species for South-west Yorkshire are listed below, with those on the **BoCC Red List** and **BoCC Amber List** highlighted in corresponding colour:

- Breeding range, 11 species: Shelduck, Shoveler, Pochard, Quail, Turtle Dove, Bittern, Marsh Harrier, Hobby, Cetti's Warbler, Yellow Wagtail, Corn Bunting
- Winter range, eight species: Ringed Plover, Green Sandpiper, Redshank, Marsh Harrier, Cetti's Warbler, Firecrest, Snow Bunting, Corn Bunting
- Breeding abundance, 15 species: Red-legged Partridge, Stock Dove, Turtle Dove, Barn Owl, Skylark, Cetti's Warbler, Sedge Warbler, Reed Warbler, Whitethroat, Goldcrest, Spotted Flycatcher, Tree Sparrow, Yellow Wagtail, Corn Bunting, Reed Bunting
- Winter abundance, 11 species: Mute Swan, Collared Dove, Common Gull, Marsh Harrier, Chiffchaff, Fieldfare, Stonechat, Tree Sparrow, Linnet, Corn Bunting, Reed Bunting

Between 1988–91 and 2008–11, there were 29 species for which relative abundance increased more (or decreased less) at/near the site compared to the relative abundance changes apparent across the rest of South-west Yorkshire. The ten species with the most positive difference in trend between site and region are listed below and all species can be seen in Figure 5.7 in Appendix 5.

- Mallard, Red-legged Partridge, Stock Dove, Great Spotted Woodpecker, House Martin, Lesser Whitethroat, Whitethroat, Yellow Wagtail, Pied/White Wagtail, Corn Bunting

There were 49 species for which the opposite was the case, i.e. that they were declining more (or increasing less) at/near the site compared to the rest of South-west Yorkshire. The ten species with the most negative difference in trend between site and region were:

- Turtle Dove, Lapwing, Snipe, Jay, Rook, Coal Tit, Willow Tit, Great Tit, Chiffchaff, Bullfinch

APPENDICES

Appendix 1. Contextual maps

Maps of the site with reference to geographical context areas at different scales, and for different sized grids used for data extraction. Note that for some of the larger context areas the site may be too small to see on the map.

Country

Country = UK, Isle of Man and Channel Islands, England



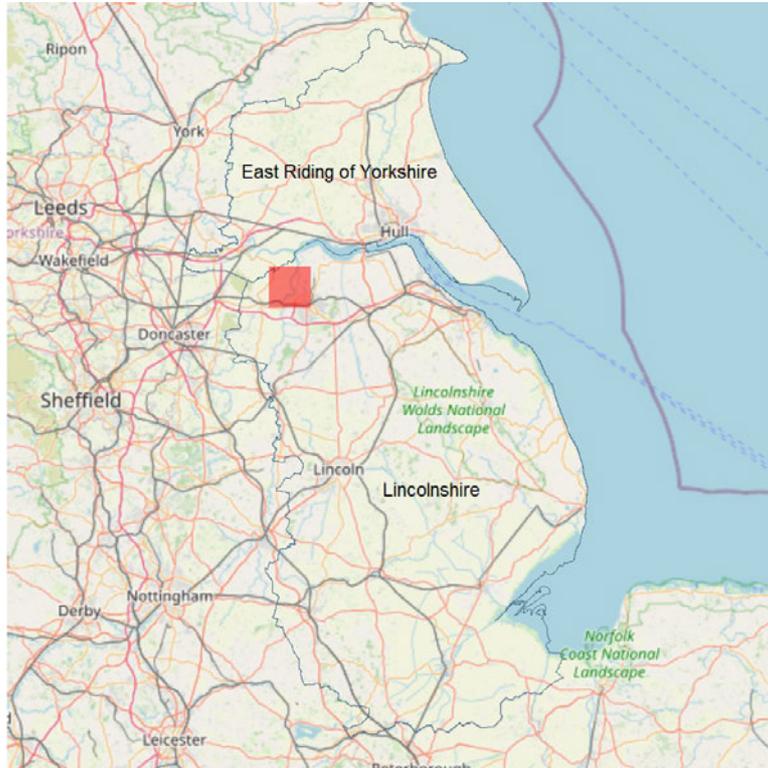
Region

Region = Yorkshire and the Humber



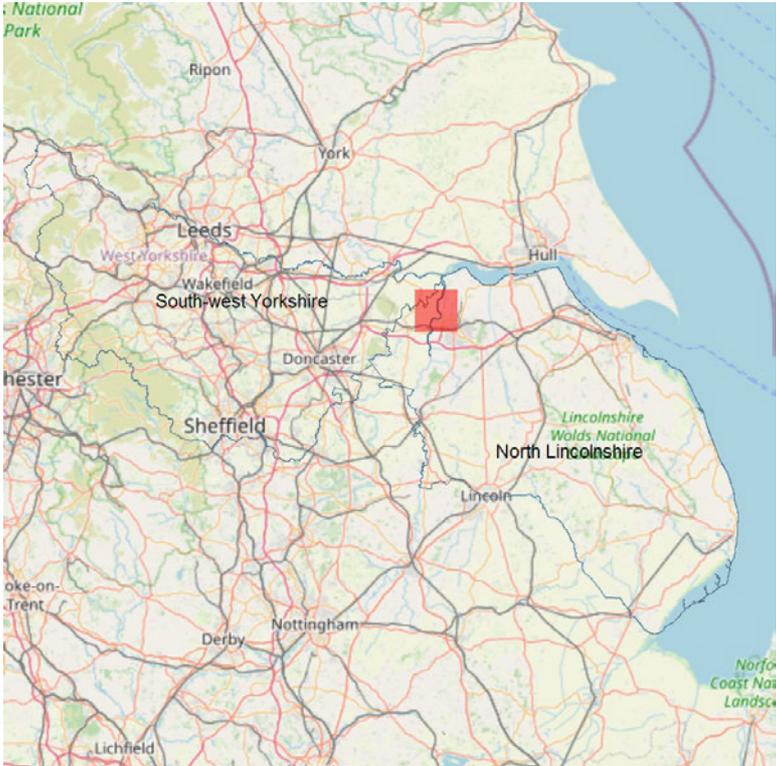
County

County = East Riding of Yorkshire, Lincolnshire



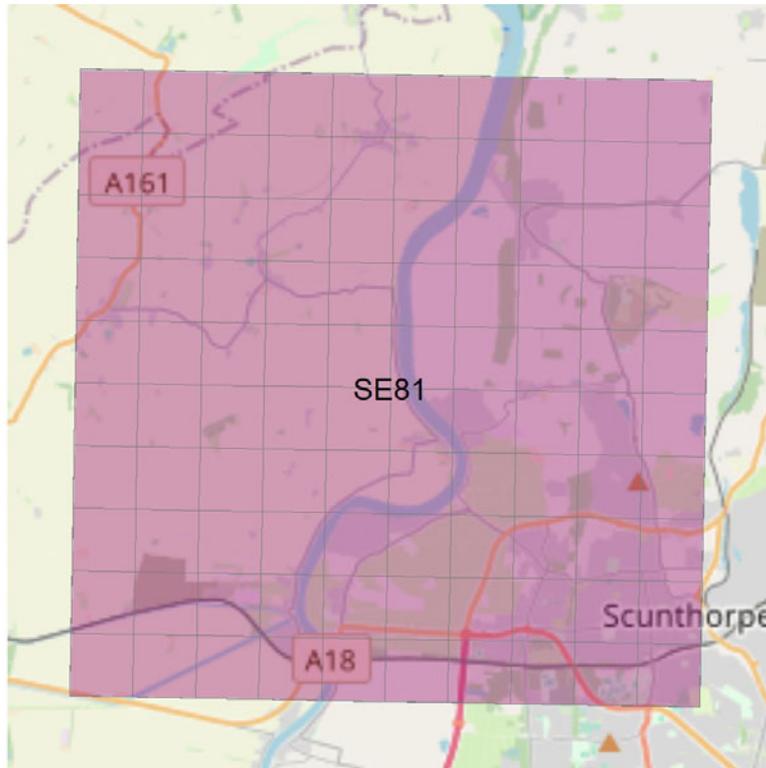
Vice-county

Vice-county = North Lincolnshire, South-west Yorkshire



Site with 1-km squares

One hundred relevant 1-km squares (too many to list).



Site with tetrads

Twenty-five relevant tetrads (too many to list).



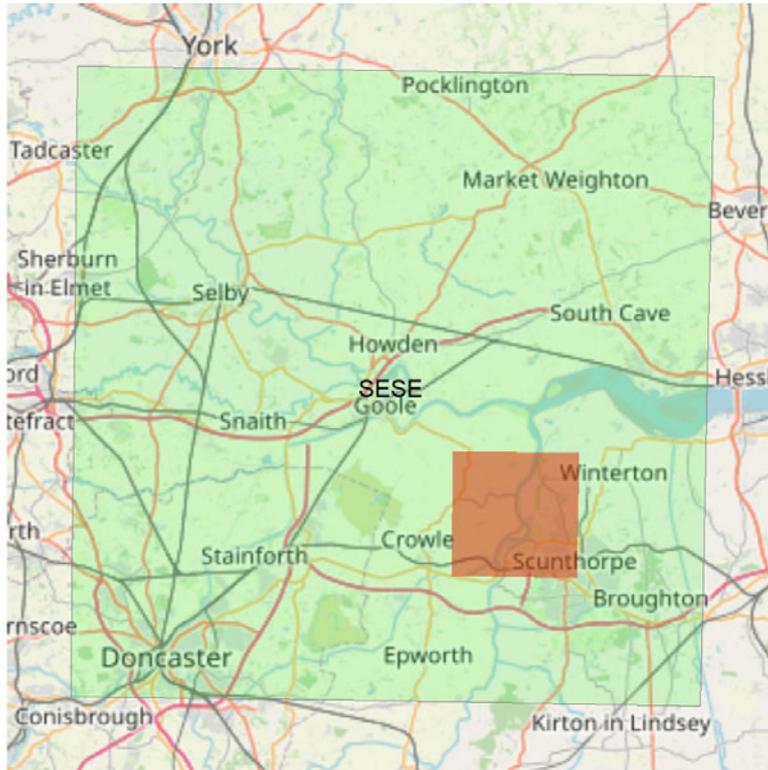
Site with 10-km squares

One relevant 10-km square : SE81



Site with 50-km squares

One relevant 50-km square : SESE

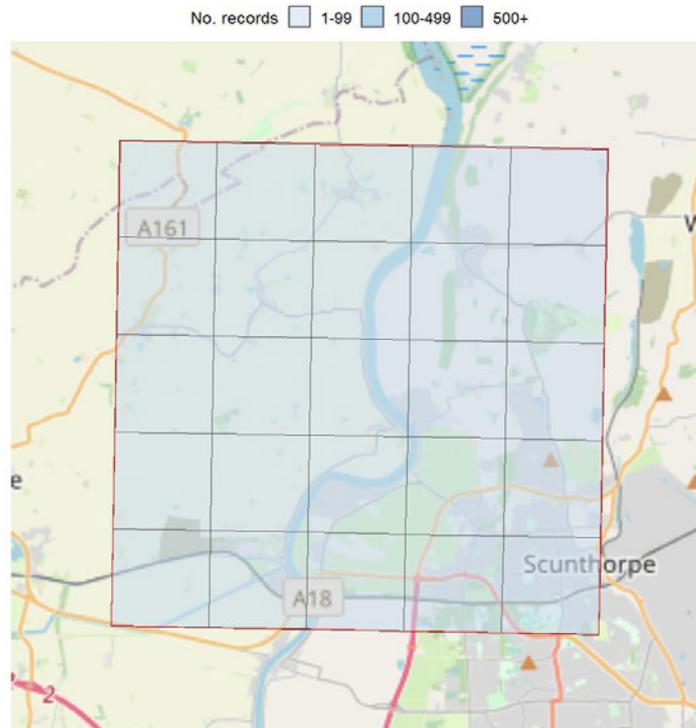


Appendix 2. Additional coverage maps

Atlas winter coverage

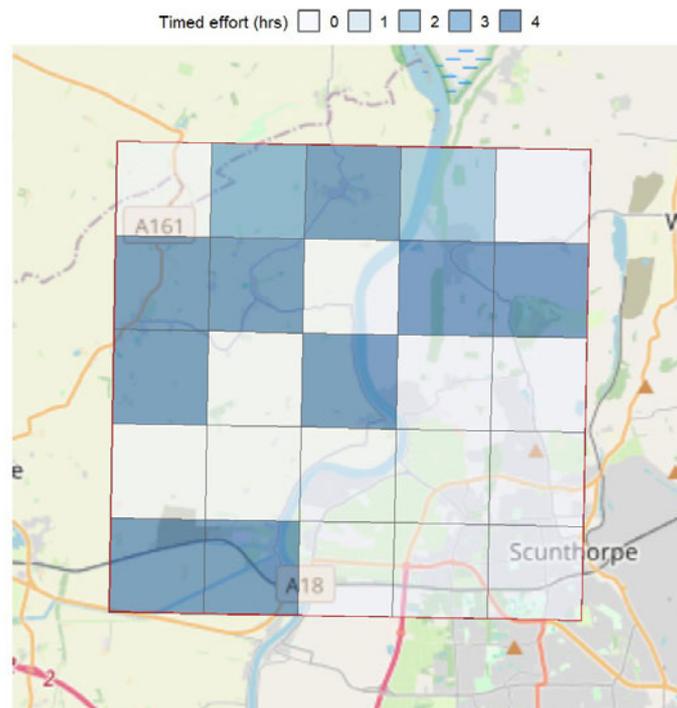
Map of unstructured Bird Atlas coverage in winter

Distribution of casual records (winter)



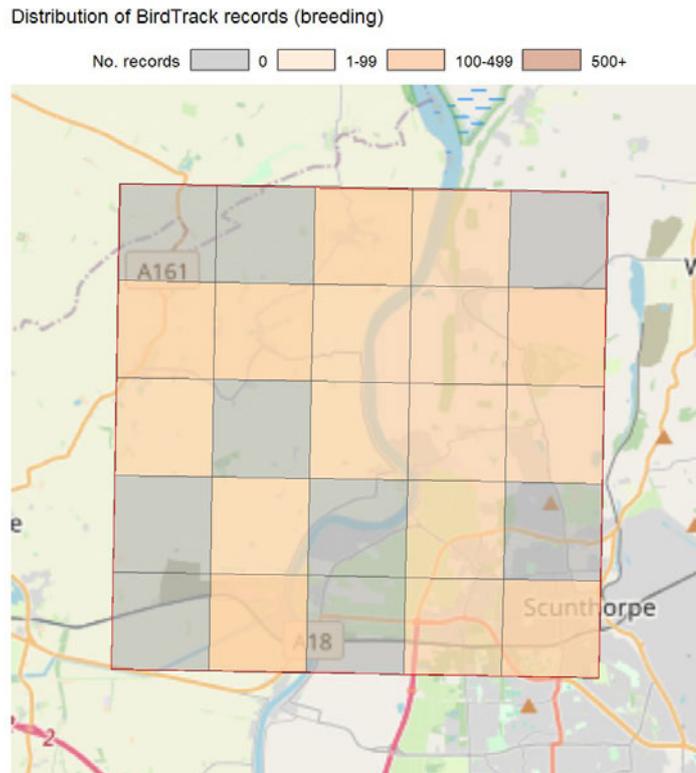
Map of structured Bird Atlas coverage in winter

Distribution of timed effort (winter)

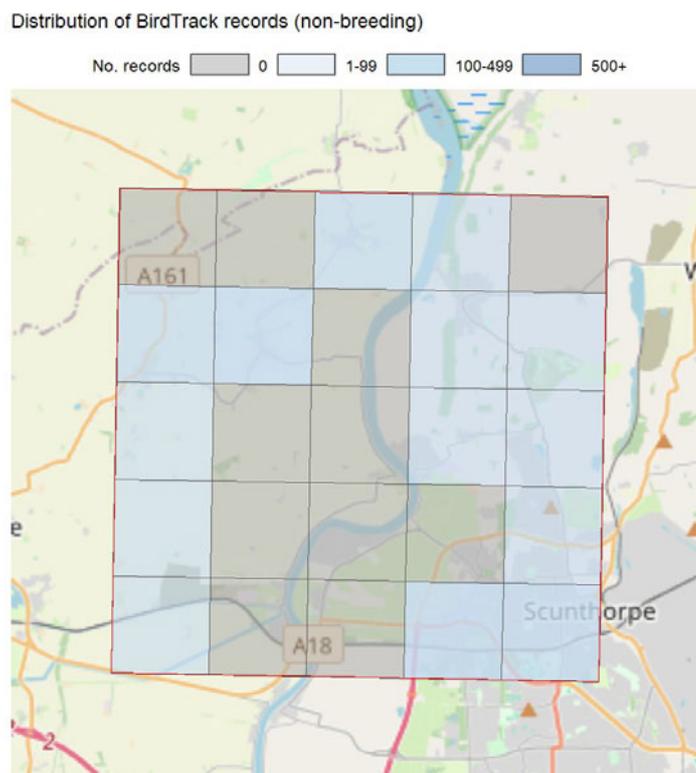


BirdTrack coverage

Map of BirdTrack recording effort in the breeding season. Grey shading indicates no sites centred in the tetrad, although sites from bordering tetrads may have extended into the tetrad.



Map of BirdTrack recording effort in the non-breeding season. Grey shading indicates no sites centred in the tetrad, although sites from bordering tetrads may have extended into the tetrad.



Appendix 3. Species list 2007–11

Feature column heading abbreviations: S1 = Schedule 1 UK; A1 = Annex 1; Amber, Red = BoCC5 Amber and Red list; CR, EN, NT, VU = GB IUCN2 Critically Endangered, Endangered, Near Threatened and Vulnerable; S41E = Section 41 England; SZA1EW = Schedule ZA1 England & Wales; S1AS = Schedule 1A Scotland; SA1S = Schedule A1 Scotland; SBL = Scottish Biodiversity List; S7W = Section 7 Wales.

Breeding season

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	Tetrad	10-km/20-km/50-km
CG	Canada Goose												Probable	Probable
GJ	Greylag Goose			Y									Possible	Possible
MS	Mute Swan												Confirmed	Confirmed
SU	Shelduck			Y	Y								Confirmed	Confirmed
SV	Shoveler			Y						Y			Possible	Possible
MA	Mallard			Y				Y					Confirmed	Confirmed
PO	Pochard		Y		Y					Y			Probable	Probable
TU	Tufted Duck							Y					Probable	Probable
P.	Grey Partridge		Y					Y			Y		Probable	Confirmed
PH	Pheasant												Confirmed	Confirmed
Q.	Quail		Y	Y	Y					Y			Possible	Possible
RL	Red-legged Partridge												Confirmed	Confirmed
SI	Swift		Y			Y							Confirmed	Confirmed
CK	Cuckoo		Y								Y		Probable	Probable
DV	Rock Dove												Confirmed	Confirmed
SD	Stock Dove			Y									Confirmed	Confirmed
WP	Woodpigeon			Y									Confirmed	Confirmed
TD	Turtle Dove		Y		Y					Y	Y		Probable	Probable
CD	Collared Dove						Y						Confirmed	Confirmed
MH	Moorhen			Y				Y					Confirmed	Confirmed
CO	Coot							Y					Confirmed	Confirmed
AN	Crane			Y				Y	Y	Y				Confirmed (50-km)
GG	Great Crested Grebe												Confirmed	Confirmed
L.	Lapwing		Y					Y			Y		Confirmed	Confirmed
BI	Bittern		Y	Y				Y	Y	Y	Y			Probable
SH	Sparrowhawk			Y				Y					Possible	Possible
MR	Marsh Harrier		Y	Y					Y	Y				Confirmed
BZ	Buzzard												Possible	Possible
BO	Barn Owl		Y										Confirmed	Confirmed
LO	Little Owl												Confirmed	Confirmed
TO	Tawny Owl			Y		Y							Confirmed	Confirmed
KF	Kingfisher		Y					Y	Y				Possible	Possible
GS	Great Spotted Woodpecker												Confirmed	Confirmed
G.	Green Woodpecker					Y							Confirmed	Confirmed
K.	Kestrel			Y				Y					Confirmed	Confirmed
HY	Hobby		Y			Y				Y				Possible
PE	Peregrine		Y						Y	Y				Confirmed
J.	Jay												Confirmed	Confirmed
MG	Magpie												Confirmed	Confirmed
JD	Jackdaw												Confirmed	Confirmed

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	Tetrad	10-km/20-km/50-km
RO	Rook			Y			Y						Confirmed	Confirmed
C.	Carrion Crow												Confirmed	Confirmed
CT	Coal Tit												Confirmed	Confirmed
WT	Willow Tit		Y			Y				Y	Y		Possible	Possible
BT	Blue Tit												Confirmed	Confirmed
GT	Great Tit												Confirmed	Confirmed
S.	Skylark		Y								Y		Confirmed	Confirmed
SM	Sand Martin												Confirmed	Confirmed
SL	Swallow							Y					Confirmed	Confirmed
HM	House Martin		Y				Y						Confirmed	Confirmed
CW	Cetti's Warbler		Y										Probable	Probable
LT	Long-tailed Tit												Confirmed	Confirmed
WW	Willow Warbler			Y									Confirmed	Confirmed
CC	Chiffchaff												Confirmed	Confirmed
SW	Sedge Warbler			Y			Y						Confirmed	Confirmed
RW	Reed Warbler												Confirmed	Confirmed
GH	Grasshopper Warbler		Y								Y		Possible	Possible
BC	Blackcap												Confirmed	Confirmed
GW	Garden Warbler												Possible	Possible
LW	Lesser Whitethroat												Probable	Probable
WH	Whitethroat			Y									Confirmed	Confirmed
GC	Goldcrest												Confirmed	Confirmed
WR	Wren			Y									Confirmed	Confirmed
NH	Nuthatch												Confirmed	Confirmed
TC	Treecreeper												Probable	Probable
SG	Starling		Y					Y			Y		Confirmed	Confirmed
ST	Song Thrush			Y							Y		Confirmed	Confirmed
M.	Mistle Thrush		Y				Y						Confirmed	Confirmed
B.	Blackbird												Confirmed	Confirmed
SF	Spotted Flycatcher		Y				Y				Y		Confirmed	Confirmed
R.	Robin												Confirmed	Confirmed
TS	Tree Sparrow		Y					Y			Y		Confirmed	Confirmed
HS	House Sparrow		Y								Y		Confirmed	Confirmed
D.	Dunnock			Y							Y		Confirmed	Confirmed
YW	Yellow Wagtail		Y				Y				Y		Confirmed	Confirmed
PW	Pied Wagtail												Confirmed	Confirmed
MP	Meadow Pipit			Y									Probable	Probable
CH	Chaffinch						Y						Confirmed	Confirmed
BF	Bullfinch			Y							Y		Confirmed	Confirmed
GR	Greenfinch		Y				Y						Confirmed	Confirmed
LI	Linnet		Y								Y		Confirmed	Confirmed
GO	Goldfinch												Confirmed	Confirmed
CB	Corn Bunting		Y				Y				Y		Confirmed	Confirmed
Y.	Yellowhammer		Y								Y		Confirmed	Confirmed
RB	Reed Bunting			Y							Y		Confirmed	Confirmed

Winter

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	Tetrad	10-km/20-km/50-km
CG	Canada Goose												Present	Present
GJ	Greylag Goose			Y									Present	Present
MS	Mute Swan												Present	Present
WS	Whooper Swan	Y		Y	Y			Y	Y				Present	Present
MA	Mallard			Y				Y					Present	Present
T.	Teal			Y									Present	Present
PO	Pochard		Y		Y					Y			Present	Present
TU	Tufted Duck							Y					Present	Present
GD	Goosander												Present	Present
P.	Grey Partridge		Y					Y			Y		Present	Present
PH	Pheasant												Present	Present
RL	Red-legged Partridge												Present	Present
DV	Rock Dove												Present	Present
SD	Stock Dove			Y									Present	Present
WP	Woodpigeon			Y									Present	Present
CD	Collared Dove						Y						Present	Present
MH	Moorhen			Y				Y					Present	Present
CO	Coot							Y					Present	Present
LG	Little Grebe												Present	Present
L.	Lapwing		Y					Y			Y		Present	Present
GP	Golden Plover								Y				Present	Present
RP	Ringed Plover		Y					Y						Present
CU	Curlew		Y		Y						Y		Present	Present
WK	Woodcock		Y					Y					Present	Present
SN	Snipe			Y				Y					Present	Present
GE	Green Sandpiper	Y		Y	Y					Y			Present	Present
RK	Redshank			Y				Y					Present	Present
BH	Black-headed Gull			Y				Y					Present	Present
CM	Common Gull			Y									Present	Present
GB	Great Black-backed Gull			Y	Y								Present	Present
HG	Herring Gull		Y		Y						Y		Present	Present
CA	Cormorant						Y						Present	Present
H.	Grey Heron							Y					Present	Present
SH	Sparrowhawk			Y				Y					Present	Present
MR	Marsh Harrier	Y		Y					Y	Y				Present
BZ	Buzzard												Present	Present
BO	Barn Owl	Y											Present	Present
LO	Little Owl													Present
TO	Tawny Owl			Y			Y						Present	Present
KF	Kingfisher	Y						Y	Y				Present	Present
GS	Great Spotted Woodpecker												Present	Present
G.	Green Woodpecker						Y						Present	Present
K.	Kestrel			Y				Y					Present	Present
ML	Merlin	Y	Y		Y			Y	Y				Present	Present
PE	Peregrine	Y							Y	Y			Present	Present
J.	Jay												Present	Present
MG	Magpie												Present	Present

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	Tetrad	10-km/20-km/50-km
JD	Jackdaw												Present	Present
RO	Rook			Y			Y						Present	Present
C.	Carrion Crow												Present	Present
WX	Waxwing									Y			Present	Present
CT	Coal Tit												Present	Present
WT	Willow Tit		Y			Y				Y	Y		Present	Present
BT	Blue Tit												Present	Present
GT	Great Tit												Present	Present
S.	Skylark		Y								Y		Present	Present
CW	Cetti's Warbler	Y											Present	Present
LT	Long-tailed Tit												Present	Present
CC	Chiffchaff												Present	Present
BC	Blackcap												Present	Present
FC	Firecrest	Y												Present
GC	Goldcrest												Present	Present
WR	Wren			Y									Present	Present
NH	Nuthatch												Present	Present
TC	Treecreeper												Present	Present
SG	Starling		Y					Y			Y		Present	Present
ST	Song Thrush			Y							Y		Present	Present
M.	Mistle Thrush		Y				Y						Present	Present
RE	Redwing	Y		Y	Y					Y			Present	Present
B.	Blackbird												Present	Present
FF	Fieldfare	Y	Y		Y					Y			Present	Present
R.	Robin												Present	Present
SC	Stonechat												Present	Present
TS	Tree Sparrow		Y					Y			Y		Present	Present
HS	House Sparrow		Y								Y		Present	Present
D.	Dunnock			Y							Y		Present	Present
GL	Grey Wagtail			Y			Y						Present	Present
PW	Pied Wagtail												Present	Present
MP	Meadow Pipit			Y									Present	Present
CH	Chaffinch					Y							Present	Present
BL	Brambling	Y								Y			Present	Present
BF	Bullfinch			Y							Y		Present	Present
GR	Greenfinch		Y			Y							Present	Present
LI	Linnet		Y								Y		Present	Present
LR	Lesser Redpoll		Y								Y		Present	Present
GO	Goldfinch												Present	Present
SK	Siskin												Present	Present
SB	Snow Bunting	Y		Y		Y				Y			Present	Present
CB	Corn Bunting		Y				Y				Y		Present	Present
Y.	Yellowhammer		Y								Y		Present	Present
RB	Reed Bunting			Y							Y		Present	Present

Appendix 4. Species list 2020-2024

Feature column heading abbreviations: S1 = Schedule 1 UK; A1 = Annex 1; Amber, Red = BoCC5 Amber and Red list; CR, EN, NT, VU = GB IUCN2 Critically Endangered, Endangered, Near Threatened and Vulnerable; S41E = Section 41 England; SZA1EW = Schedule ZA1 England & Wales; S1AS = Schedule 1A Scotland; SA1S = Schedule A1 Scotland; SBL = Scottish Biodiversity List; S7W = Section 7 Wales.

Breeding season

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	1-km	2-km	10-km	>10-km	
MS	Mute Swan																Present
SU	Shelduck			Y		Y							Present				
MA	Mallard			Y				Y					Present	Present	Present	Present	
P.	Grey Partridge		Y					Y			Y						Present
PH	Pheasant												Present	Present	Present	Present	
RL	Red-legged Partridge																Present
SI	Swift		Y			Y								Present	Present		Probable
CK	Cuckoo		Y								Y						Possible
DV	Rock Dove																Present
SD	Stock Dove			Y									Present				Present
WP	Woodpigeon			Y									Present	Present	Present		Probable
CD	Collared Dove						Y							Present	Present		Possible
MH	Moorhen			Y				Y						Present	Present		
AN	Crane			Y				Y	Y	Y							Present
BN	Black-necked Grebe	Y		Y		Y					Y						Present
OC	Oystercatcher			Y				Y									Present
GP	Golden Plover								Y								Present
SN	Snipe			Y				Y									Present
GE	Green Sandpiper	Y		Y	Y						Y						Present
RK	Redshank			Y				Y									Present
BH	Black-headed Gull			Y				Y						Present	Present	Present	
CM	Common Gull			Y											Present	Present	
HG	Herring Gull		Y			Y					Y						Present
LB	Lesser Black-backed Gull			Y									Present				
CA	Cormorant						Y										Present
H.	Grey Heron							Y						Present	Present	Present	
ET	Little Egret								Y	Y							Present
OP	Osprey	Y		Y		Y		Y	Y			Y					Present
SH	Sparrowhawk			Y				Y						Present	Present		Probable
MR	Marsh Harrier	Y		Y					Y	Y							Present
BZ	Buzzard												Present				Present
BO	Barn Owl		Y														Present
GS	Great Spotted Woodpecker																Present
G.	Green Woodpecker						Y							Present	Present	Present	
K.	Kestrel			Y				Y							Present	Present	
J.	Jay																Present
MG	Magpie												Present	Present	Present	Present	
JD	Jackdaw												Present	Present	Present	Present	
RO	Rook			Y		Y							Present				Present
C.	Carion Crow												Present	Present	Present	Present	

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	1-km	2-km	10-km	>10-km	
CT	Coal Tit													Present	Possible	Present	
BT	Blue Tit													Present	Present	Present	
GT	Great Tit													Present	Present	Present	
S.	Skylark		Y								Y		Present	Present	Present	Present	
SM	Sand Martin															Present	
SL	Swallow							Y					Present	Present	Present	Present	
HM	House Martin		Y			Y								Present	Present	Present	
CW	Cetti's Warbler	Y														Present	
LT	Long-tailed Tit															Present	
WW	Willow Warbler			Y											Present	Present	
CC	Chiffchaff													Present	Present	Present	
SW	Sedge Warbler			Y		Y								Present	Present	Present	
RW	Reed Warbler															Present	
BC	Blackcap													Present	Present	Present	
GW	Garden Warbler														Present		
LW	Lesser Whitethroat															Present	
WH	Whitethroat			Y									Present	Present	Present	Possible	
GC	Goldcrest													Present	Present		
WR	Wren			Y										Possible	Possible	Present	
NH	Nuthatch													Present	Present	Present	
TC	Treecreeper													Present	Present		
SG	Starling		Y					Y			Y			Present	Present	Confirmed	
ST	Song Thrush			Y							Y			Possible	Possible	Present	
M.	Mistle Thrush		Y				Y								Present	Present	
RE	Redwing	Y		Y	Y					Y				Present	Present	Present	
B.	Blackbird													Present	Present	Possible	Confirmed
RZ	Ring Ouzel		Y				Y				Y					Present	
R.	Robin													Present	Possible	Probable	
TS	Tree Sparrow		Y					Y			Y		Present			Present	
HS	House Sparrow		Y								Y			Present	Present	Probable	
D.	Dunnock			Y							Y			Present	Possible	Present	
YW	Yellow Wagtail		Y				Y				Y		Present	Present	Present	Present	
GL	Grey Wagtail			Y			Y									Present	
PW	Pied Wagtail													Present	Present	Present	
MP	Meadow Pipit			Y									Present			Present	
CH	Chaffinch					Y								Possible	Possible	Present	
BF	Bullfinch			Y							Y					Probable	
GR	Greenfinch		Y			Y								Present	Present	Present	
LI	Linnet		Y								Y		Present			Present	
LR	Lesser Redpoll		Y								Y					Present	
GO	Goldfinch													Present	Present	Present	
CB	Corn Bunting		Y				Y				Y		Present	Possible	Possible		
Y.	Yellowhammer		Y								Y			Present	Present	Present	
RB	Reed Bunting			Y							Y		Present	Present	Present	Present	

Non-breeding season

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	1-km	2-km	10-km	>10-km
GJ	Greylag Goose			Y												Present
PG	Pink-footed Goose			Y						Y				Present	Present	Present

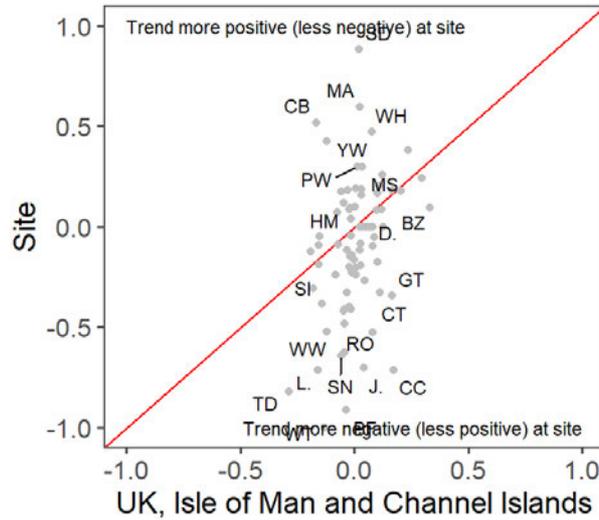
Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	1-km	2-km	10-km	>10-km	
MS	Mute Swan																Present
WS	Whooper Swan	Y		Y		Y			Y	Y				Present	Present		
SU	Shelduck			Y		Y											Present
SV	Shoveler			Y						Y				Present	Present	Present	
GA	Gadwall			Y										Present	Present	Present	
WN	Wigeon			Y				Y		Y				Present	Present	Present	
MA	Mallard			Y				Y						Present	Present	Present	
PT	Pintail			Y	Y					Y				Present	Present		
T.	Teal			Y										Present	Present	Present	
PO	Pochard		Y			Y				Y				Present	Present		
TU	Tufted Duck							Y						Present	Present		
GN	Goldeneye		Y					Y		Y				Present	Present		
P.	Grey Partridge		Y					Y			Y			Present	Present	Present	
PH	Pheasant													Present	Present	Present	
DV	Rock Dove													Present	Present	Present	
SD	Stock Dove			Y										Present	Present	Present	
WP	Woodpigeon			Y										Present	Present	Present	
CD	Collared Dove						Y							Present	Present	Present	
WA	Water Rail													Present	Present	Present	
MH	Moorhen			Y				Y						Present	Present	Present	
LG	Little Grebe													Present	Present	Present	
L.	Lapwing		Y					Y			Y			Present	Present	Present	
GP	Golden Plover								Y					Present	Present	Present	
GV	Grey Plover			Y				Y									Present
CU	Curlew		Y			Y					Y			Present	Present	Present	
BW	Black-tailed Godwit	Y	Y			Y				Y				Present	Present	Present	
RU	Ruff	Y	Y		Y				Y	Y				Present	Present	Present	
CV	Curlew Sandpiper			Y													Present
DN	Dunlin		Y					Y	Y					Present	Present	Present	
WK	Woodcock		Y					Y						Present	Present	Present	
SN	Snipe			Y				Y						Present	Present	Present	
GE	Green Sandpiper	Y		Y	Y					Y				Present	Present	Present	
RK	Redshank			Y				Y						Present	Present	Present	
DR	Spotted Redshank			Y		Y											Present
GK	Greenshank	Y		Y						Y							Present
BH	Black-headed Gull			Y				Y						Present	Present	Present	
CM	Common Gull			Y										Present	Present	Present	
YG	Yellow-legged Gull			Y		Y				Y				Present	Present		
LB	Lesser Black-backed Gull			Y										Present	Present	Present	
H.	Grey Heron							Y						Present	Present	Present	
HW	Great White Egret			Y		Y			Y	Y				Present	Present		
ET	Little Egret								Y	Y				Present	Present	Present	
SH	Sparrowhawk			Y				Y						Present	Present	Present	
MR	Marsh Harrier	Y		Y					Y	Y				Present	Present	Present	
BZ	Buzzard													Present	Present	Present	
TO	Tawny Owl			Y			Y							Present	Present		
KF	Kingfisher	Y							Y	Y				Present	Present		
GS	Great Spotted Woodpecker													Present	Present	Present	
G.	Green Woodpecker						Y								Present	Present	
K.	Kestrel			Y				Y						Present	Present	Present	

Code	Species	S1	Red	Amber	CR	EN	NT	VU	A1	RBBP	S41E	SZA1EW	1-km	2-km	10-km	>10-km
PE	Peregrine	Y							Y	Y						Present
J.	Jay													Present	Present	
MG	Magpie													Present	Present	Present
JD	Jackdaw													Present	Present	Present
RO	Rook			Y			Y									Present
C.	Carrion Crow													Present	Present	Present
WX	Waxwing									Y						Present
CT	Coal Tit													Present	Present	Present
BT	Blue Tit													Present	Present	Present
GT	Great Tit													Present	Present	Present
BR	Bearded Tit	Y								Y				Present	Present	Present
S.	Skylark		Y								Y			Present	Present	Present
SL	Swallow							Y						Present	Present	Present
HM	House Martin		Y				Y							Present	Present	Present
CW	Cetti's Warbler	Y												Present	Present	Present
LT	Long-tailed Tit													Present	Present	Present
YB	Yellow-browed Warbler			Y			Y									Present
CC	Chiffchaff													Present	Present	Present
BC	Blackcap															Present
GC	Goldcrest															Present
WR	Wren			Y										Present	Present	Present
NH	Nuthatch															Present
TC	Treecreeper													Present	Present	Present
SG	Starling		Y					Y			Y			Present	Present	Present
ST	Song Thrush			Y							Y			Present	Present	Present
M.	Mistle Thrush		Y				Y							Present	Present	
RE	Redwing	Y		Y	Y					Y				Present	Present	Present
B.	Blackbird													Present	Present	Present
FF	Fieldfare	Y	Y		Y					Y				Present	Present	Present
R.	Robin													Present	Present	Present
SC	Stonechat															Present
W.	Wheatear			Y		Y								Present	Present	
TS	Tree Sparrow		Y					Y			Y			Present	Present	Present
HS	House Sparrow		Y								Y					Present
D.	Dunnock			Y							Y			Present	Present	Present
GL	Grey Wagtail			Y			Y									Present
PW	Pied Wagtail													Present	Present	Present
MP	Meadow Pipit			Y										Present	Present	Present
CH	Chaffinch					Y								Present	Present	Present
BL	Brambling	Y								Y						Present
BF	Bullfinch			Y							Y			Present	Present	Present
GR	Greenfinch		Y			Y										Present
LI	Linnet		Y								Y			Present	Present	Present
FR	Common Redpoll									Y						Present
LR	Lesser Redpoll		Y								Y				Present	
GO	Goldfinch													Present	Present	Present
SK	Siskin															Present
CB	Corn Bunting		Y				Y				Y			Present	Present	
Y.	Yellowhammer		Y								Y			Present	Present	Present
RB	Reed Bunting			Y							Y			Present	Present	Present

Appendix 5. Abundance change figures

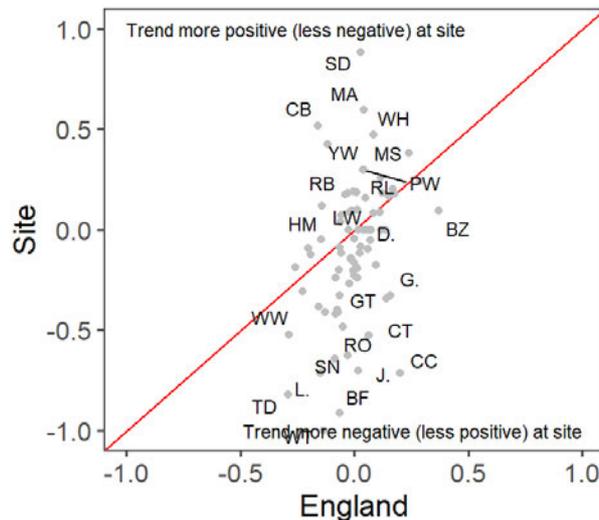
5.1 Country: UK, Isle of Man and Channel Islands

Relative abundance changes for the site and its vicinity compared to the rest of UK, Isle of Man and Channel Islands. Species above the line of equality have more positive/less negative trends at/near the site compared to the country (see Appendix 4 for species codes).



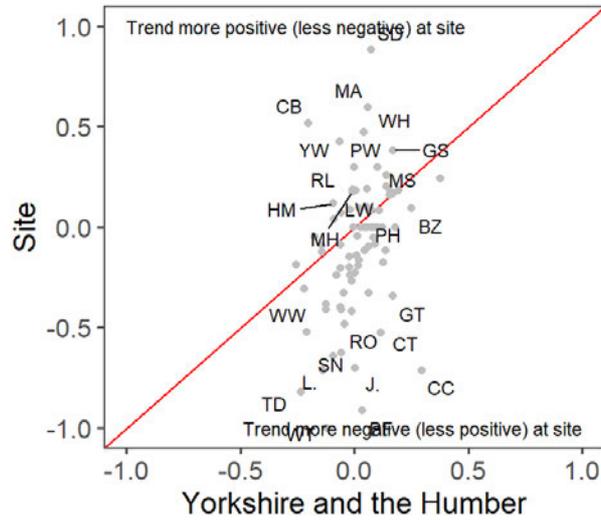
5.2 Country: England

Relative abundance changes for the site and its vicinity compared to the rest of England. Species above the line of equality have more positive/less negative trends at/near the site compared to the country (see Appendix 4 for species codes).



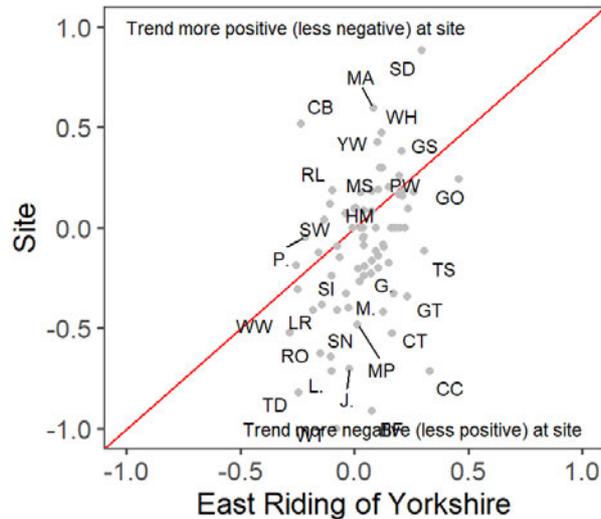
5.3 Region: Yorkshire and the Humber

Relative abundance changes for the site and its vicinity compared to the rest of Yorkshire and the Humber. Species above the line of equality have more positive/less negative trends at/near the site compared to the country (see Appendix 4 for species codes).



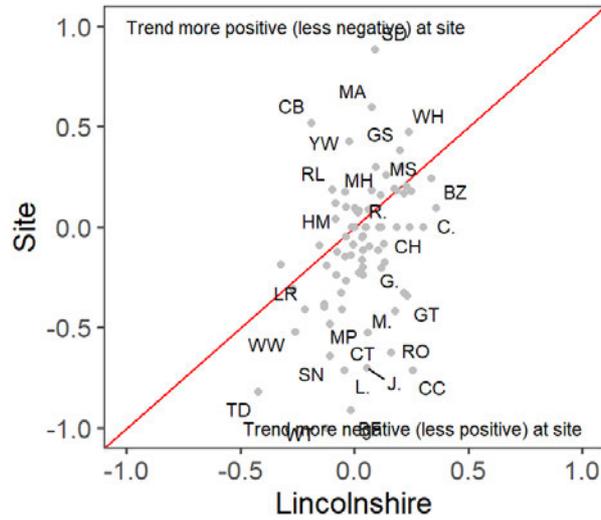
5.4 County: East Riding of Yorkshire

Relative abundance changes for the site and its vicinity compared to the rest of East Riding of Yorkshire. Species above the line of equality have more positive/less negative trends at/near the site compared to the country (see Appendix 4 for species codes).



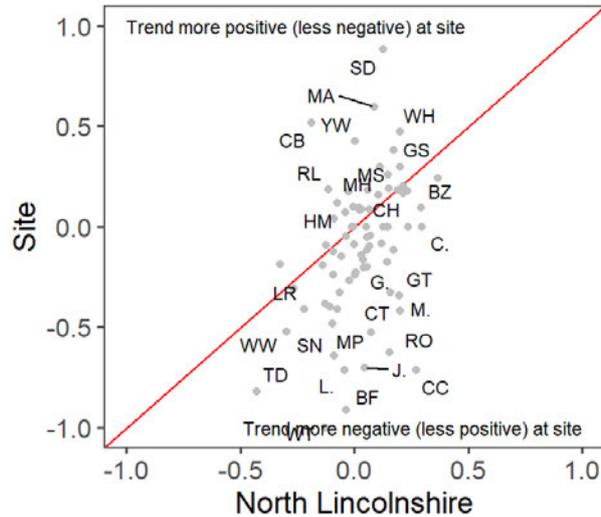
5.5 County: Lincolnshire

Relative abundance changes for the site and its vicinity compared to the rest of Lincolnshire. Species above the line of equality have more positive/less negative trends at/near the site compared to the country (see Appendix 4 for species codes).



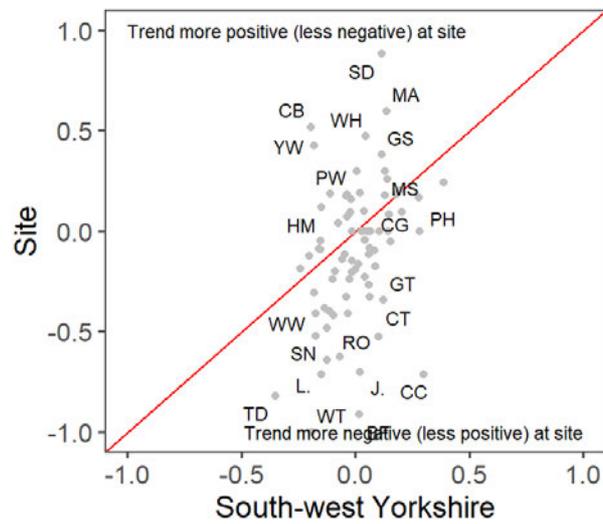
5.6 Vice-county: North Lincolnshire

Relative abundance changes for the site and its vicinity compared to the rest of North Lincolnshire. Species above the line of equality have more positive/less negative trends at/near the site compared to the country (see Appendix 4 for species codes).



5.7 Vice-county: South-west Yorkshire

Relative abundance changes for the site and its vicinity compared to the rest of South-west Yorkshire. Species above the line of equality have more positive/less negative trends at/near the site compared to the country (see Appendix 4 for species codes).





Images: Landscape, Simon Gillings; Barn Owl, Liz Cutting

BTO Data Report

BTO Data Reports provide rigorous scientific information to inform desk studies for ecological impact assessment of proposed development sites. Reports collate comprehensive and contemporary bird distribution and abundance data from the BTO's ornithological datasets. As most biological data are collected in grid squares, spatial analyses identify which grid squares can be associated with the site and its vicinity at different spatial scales. Reports lists all species present at or near the site in the breeding season and in winter, highlighting those of statutory or conservation importance (e.g. Schedule 1, Red List). They also assess the potential importance of the site across a local, regional and national context, listing species for which the site and vicinity account for a high proportion of local, regional or national geographical range and population size.

BTO Data Reports provide unique insights into the bird community present in the vicinity of potential development sites, helping to guide the need for detailed field surveys and highlighting potential priorities for delivering habitat mitigation, enhancement and biodiversity net gain.

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Appendix E Results of the Air Quality Impact Assessment (as Reported in ES Volume I Chapter 8)

Table E1: Construction Results for the Humber Estuary SAC and Ramsar Site (Study Area 200m from affected road network) - NOx

Ecological receptor ID	Distance from affected road network	Critical Level for NOx ($\mu\text{g}/\text{m}^3$)	Max NO _x change (DS-DM) ($\mu\text{g}/\text{m}^3$)	Max NOx change as % of critical level
ER1a	20m	30	0.1	0.4%
ER1b	40m	30	<0.1	0.1%
ER1c-j	60-200m	30	<0.1	<0.1%

Table E2: Construction Results for European Sites (Study Area 200m from affected road network) – Ammonia

Ecological receptor ID	Distance from affected road network	Critical Level for NH ₃ (µg/m ³)	Max NH ₃ change (DS-DM) (µg/m ³)	Max NH ₃ change as % of critical level
ER1a	20m	3	0.01	0.5%
ER1b-e	40-100m	3	<0.01	0.1%
ER1f-j	120-200m	3	<0.01	<0.1%

Table E3: Construction Results for European Sites (Study Area 200m from affected road network) – Nitrogen deposition (kg N/ha/yr)

Ecological receptor ID	Distance from affected road network	Critical Load (min) (kg N/ha/yr)	DS-DM nitrogen deposition (Kg N/ha/yr)	Max nitrogen deposition change (DS-DM) as % of critical load
ER1a	20m	20 <u>20 (pioneer saltmarsh)</u>	0.1	0.4% <u>(pioneer saltmarsh)</u>
		<u>10 (upper saltmarsh)</u>		<u>1% (upper saltmarsh)</u>
		<u>15 (rich fen)</u>		<u>0.7% (rich fen)</u>

Ecological receptor ID	Distance from affected road network	Critical Load (min) (kg N/ha/yr)	DS-DM nitrogen deposition (Kg N/ha/yr)	Max nitrogen deposition change (DS-DM) as % of critical load
ER1b-d	40-80m	20 20 (pioneer saltmarsh) 10 (upper saltmarsh) 15 (rich fen)	<0.1	0.1%
ER1e-j	100-200m	20 20 (pioneer saltmarsh) 10 (upper saltmarsh) 15 (rich fen)	<0.1	<0.1%

Table E4: Construction Results for European Sites (Study Area 200m from affected road network) – Acid deposition

Ecological receptor ID	Distance from affected road network	Critical Load (keq/ha/yr)	DS-DM acid deposition (Kg N/ha/yr)	Max acid deposition change (DS-DM) as % of critical load (%)
ER1a	20m	Min CL Min N: 1.071 Min CL Max N: 5.071 Min CL Max S: 4.00	0.01	<0.1%
ER1b-j	40-200m	Min CL Min N: 1.071 Min CL Max N: 5.071 Min CL Max S: 4.00	<0.01	<0.01%

Table E5: Operation Results for European Sites (Study Area 15km) – NOx

Recept or ID	Site Name	Annual average (µg/m ³)						24-hour average (µg/m ³)					
		CL	PC	PC % of CL	Modified BC	PEC	PEC % of CL	CL	PC	PC % of CL	Modified BC	PEC	PEC % of CL
OE1-5	Humber Estuary Ramsar and SAC		0.81	2.7%	9.4	10.2	34%		16.4	22%	14.0	30.4	41%
OE10	Thorne Moor SAC	30	0.08	0.3%	7.9	7.9	26%	75	2.4	3%	11.8	14.2	19%
OE13	Hatfield Moor SAC		0.06	0.2%	8.5	8.6	29%		1.8	2%	12.8	14.6	19%
OE32	Humber Estuary (at Blacktoft Sands)		0.23	0.8%	9.7	9.9	33%		1.9	3%	14.5	16.4	22%

Recept or ID	Site Name	Annual average ($\mu\text{g}/\text{m}^3$)						24-hour average ($\mu\text{g}/\text{m}^3$)						
		CL	PC	PC % of CL	Modified BC	PEC	PEC % of CL	CL	PC	PC % of CL	Modified BC	PEC	PEC % of CL	
	Ramsar, SAC, SPA and SSSI													

CL = Critical Level, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

Table E6: Operation Results for European Sites (Study Area 15km) – Ammonia

Receptor ID	Site Name	Annual Average ($\mu\text{g}/\text{m}^3$)					
		CL	PC	PC % of CL	Modified BC	PEC	PEC % of CL
OE1-5	Humber Estuary SAC, Ramsar	3	0.05	1.7%	1.96	2.01	67%
OE10	Thorne Moor SAC, SPA	1	0.01	0.5%	1.71	1.71	171%
OE13	Hatfield Moor SAC, SPA	1	0.004	0.4%	1.50	1.51	151%
OE32	Humber Estuary (at Blacktoft Sands) Ramsar, SPA, SAC	3	0.01	0.5%	1.72	1.73	58%

CL = Critical Level, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

Table E7: Operation Results for European Sites (Study Area 15km) – Nutrient nitrogen deposition (Kg N/Ha/Yr)

Receptor ID	Site name	Modified Background nitrogen deposition (kg N/ha/yr)	Most stringent Critical Load class applicable for the site	Lower value of applicable Critical Load range	PC (kg N/ha/yr)	PC % Critical Load	PEC (kg N/ha/yr)	PEC % Critical Load	
OE1-5	Humber Estuary Ramsar, SAC	16.4	Pioneer saltmarsh	20	0.32	1.6%	16.7	84%	
			<u>Upper-mid saltmarsh</u>	<u>10</u>	<u>0.32</u>	<u>3.2%</u>	<u>16.7</u>	<u>167%</u>	
			<u>Rich fen</u>	<u>15</u>	<u>0.32</u>	<u>2.1%</u>	<u>16.7</u>	<u>111%</u>	
			14.1	Raised and blanket bogs	5	0.04	0.7%	14.2	283%
OE10	Thorne Moor SAC, SPA	27.0	Temperate mountain Picea forest, Temperate mountain Abies forest	10	0.05	0.5%	27.1	271%	
			13.0	Raised and blanket bogs	5	0.02	0.5%	13.1	261%
			OE13	Hatfield Moor SAC, SPA	25.0	Temperate mountain Picea forest, Temperate mountain Abies forest	10	0.04	0.4%
OE32	Humber Estuary (at Blacktoft Sands) Ramsar, SAC, SPA	14.8				Rich Fens fen	15	0.10	0.6%

Receptor ID	Site name	Modified Background nitrogen deposition (kg N/ha/yr)	Most stringent Critical Load class applicable for the site	Lower value of applicable Critical Load range	PC (kg N/ha/yr)	PC % Critical Load	PEC (kg N/ha/yr)	PEC % Critical Load
			<u>Upper-mid saltmarsh</u>	<u>10</u>	<u>0.10</u>	<u>1%</u>	<u>14.9</u>	<u>149%</u>

Table E8: Operation Results for European Sites (Study Area 15km) – Acid deposition

Receptor ID	Site name	Acid deposition			PC acid deposition (keq/ha/yr)			
		Critical Load (keq/ha/yr)	Modified Baseline (keq/ha/yr)	Lowest Critical Load class applicable	Modified Baseline % of Critical Load	PC	PC % of Critical Load	PEC% of Critical Load
OE1-5	Humber Estuary Ramsar, SAC	Min CL Min N: 0.856 Min CL Max N: 4.856 Min CL Max S: 4.00	N: 1.182 S: 0.16	Calcareous grassland (using base cation)	27.6%	0.023	0.4%	28.2%
OE10	Thorne Moor SAC, SPA	Min CL Min N: 0.142 Min CL Max N: 0.498 Min CL Max S: 0.213	N: 1.924 S: 0.16	Unmanaged Broadleaved/Coniferous Woodland	418.5%	0.004	0.8%	419.3%
OE13	Hatfield Moor SAC, SPA	Min CL Min N: 0.285 Min CL Max N: 0.475 Min CL Max S: 0.154	N: 1.813 S: 0.16	Unmanaged Broadleaved/Coniferous Woodland	386.9%	0.003	0.6%	387.5%

Receptor ID	Site name	Acid deposition			PC acid deposition (keq/ha/yr)			
		Critical Load (keq/ha/yr)	Modified Baseline (keq/ha/yr)	Lowest Critical Load class applicable	Modified Baseline % of Critical Load	PC	PC % of Critical Load	PEC% of Critical Load
OE32	Humber Estuary (at Blacktoft Sands) Ramsar, SAC, SPA	Fen, Marsh and Swamp — Not sensitive to acidity			31.1%	0.007	0.1%	31.1%
		Salt marsh — Not sensitive to acidity						
		<u>Min CL Min N: 0.856</u>	<u>N: 1.29</u>	<u>Calcareous</u>				
		<u>Min CL Max N: 4.856</u>	<u>S: 0.22</u>	<u>grassland (using base cation)</u>				
		<u>Min CL Max S: 4.00</u>						

Appendix F Other Plans and Projects of Potential Relevance to the In-Combination Assessment

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
1	Humber Carbon Pipeline DCO	<p>Development of an onshore underground CO₂ pipeline and associated above ground infrastructure to transport captured carbon dioxide from emitters in the Humber region from Drax (in North Yorkshire) to Easington on the coast (within East Riding of Yorkshire) to connect with a secure offshore storage in the North Sea.</p> <p>Construction could start in 2028 and continue to 2032.</p>	<p>No - Scoped out for in-combination assessment.</p> <p>If consented, there could be an overlap in construction periods, dependent on the location where works commence and the speed of progression. Therefore it is assumed that the CO₂ pipeline and the Keadby AGI (the 'Keadby Spur Line') could be constructed in parallel with the Proposed Development and this will result in cumulative effects. The relevant activities are described in the Scoping Report (Net Zero North Sea Storage Limited, 2025).</p> <p>Construction of the Keadby AGI is not likely to materially add to the construction impacts and effects of the Proposed Development, given the footprint for the AGI would be no more than 100m x 90m and located within an arable field. Both developments would occupy land of low ecological value. Whilst the farmland occupied by the AGI could be used by qualifying bird</p>

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			<p>species, the evidence presented in this HRA Appropriate Assessment report remains applicable. There is no evidence that the farmland within the construction zone of influence has functional importance for qualifying bird species so no LSE are anticipated, alone or in-combination.</p> <p>The pipeline required for the spur line is stated to be approximately 30cm in diameter, so the required pipe is relatively small. Ground disturbances necessary to install this pipe 1.2m below ground level would be broadly consistent with existing agricultural land management regimes and machinery, and the works would be incremental and any disturbance temporary. There is no evidence that the habitats crossed by the pipeline within the zone of influence of the Proposed Development have importance for qualifying bird species and no other qualifying features would be affected. No LSE are anticipated, alone or in-combination.</p>
2	North Lincolnshire	The Project (consented March 2025) consists of an Energy Recovery Facility (ERF) converting up	No - the HRA Report for this development considered Keadby CCS which is comparable

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
	Green Energy Park DCO	to 650,000 tonnes per annum of Refuse Derived Fuel (RDF) to generate a maximum of 95 Mega Watts of electrical output (MWe) and/or 380 Mega Watts of thermal output (MWt) to provide power, heat and steam on the site of the operating Flixborough Wharf on the River Trent.	<p>with the Proposed Development (albeit also including works in the River Trent, which does not form part of the Proposed Development).</p> <p>In reaching a decision the SoS concluded that, alone or in-combination, an Adverse Effect on Integrity of the relevant European Sites can be excluded beyond all reasonable scientific doubt.</p> <p>Given this conclusion and the currentness of the decision, there is no reason to re-visit this in relation to the Proposed Development. <u>as the approach taken by this development (including mitigation) precludes pathways for in-combination effects and not are predicted in the air quality section of Chapter 21 of the ES.</u></p>
4	Tween Bridge Solar Farm DCO	Construction, operation, management and decommissioning of a ground mounted solar photovoltaic (PV) electricity generating facility exceeding 50 megawatt (MW) output capacity, together with associated works including substation, energy storage and green infrastructure. Potential for overlap in construction periods.	No – whilst construction of this development could affect qualifying bird species foraging on arable land, there is no likely comparable impact from construction of the Proposed Development. So, there are no likely in-combination effects. As explained in Section 6, there is no data that indicates that the arable farmland in the zone of influence of the Proposed Development has functional importance for qualifying bird species.

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			<p>Further, there is no potential for an in-combination impact during operation, the Proposed Development would not affect qualifying features.</p>
5	North Humber to High Marnham DCO	Electricity power line project. The project is at PEI Report stage. The Scoping Report states that construction is expected to start in 2028 and be completed by 2031, so there is a potential overlap with construction phase of Proposed Development.	<p>No - Scoped out for in-combination assessment. If consented, there could be an overlap in construction periods, dependent on the location where works commence and the speed of progression. Therefore it is assumed that construction activities in the farmed landscape around Keadby in parallel with the Proposed Development and this will result in cumulative effects.</p> <p>Construction is not likely to materially add to the construction impacts and effects of the Proposed Development. Both developments would occupy land of low ecological value. Whilst the affected farmland occupied could be used by qualifying bird species, the evidence presented in this HRA Appropriate Assessment report remains applicable. There is no evidence that the farmland within the construction zone of influence has functional importance for qualifying</p>

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			<p>bird species so no LSE are anticipated, alone or in-combination.</p> <p>The above stated, the relevant details and impacts of this project are subject to review at the time of Application. Therefore, it is considered that it would be for this development to make an in-combination assessment with reference to the progression of the Proposed Development at that time.</p>
7	Little Crow Solar Park DCO	<p>Consented energy scheme comprising ground mounted solar photovoltaic arrays, electrical storage, grid connection infrastructure and other infrastructure integral to its construction, operation, maintenance and decommissioning. The solar park will have an intended design capacity of over 50MWp (megawatts peak). Potential overlap with construction phase of Proposed Development.</p>	<p>No – beyond the likely zone of influence for in-combination effects. The HRA No Significant Effects Report identified no use of the site by, and therefore LSE on, relevant qualifying features (birds of the Humber Estuary).</p>
8	PA/2017/1513 (outline) and PA/2021/1179 (reserved matters)	<p>Residential development of 27 dwellings. Potential overlap with construction phase of Proposed Development.</p>	<p>No – located within the curtilage of Althorpe and small-scale nature of the proposal. No likely interface with qualifying features given the site and development context.</p>

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
9	PA/2020/660	Mixed use development: hotel (Class C1), gym (Class D2), retail units (Class A1), food and drink and drive-thru restaurants (Class A3/A5), with access, car parking, landscaping and associated works. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context.
10	PA/2019/1807	Planning permission to extend industrial building to create additional space for an existing unit and to create 4 new commercial units together with the creation of 3 new vehicular accesses and reconfiguration of parking area. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context.
11	PA/2017/824	Residential development of 29 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location and small-scale nature of the proposal. No likely interface with qualifying features given the site and development context.
12	PA/2020/1333 (outline) and PA/2024/780 (reserved matters)	Residential development of 128 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context.

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
13	PA/2021/1208	Residential development of 24 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location and small-scale nature of the proposal. No likely interface with qualifying features given the site and development context.
14	PA/2017/1975 (outline) and PA/2020/1413 (reserved matters)	Residential development of 23 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context.
15	PA/2024/362	Residential development of 14 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban location and small-scale nature of the proposal. No likely interface with qualifying features given the site and development context.
16	PA/2023/1903	Residential development of 67 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context.
17	PA/2023/1915 (following scoping request PA/SCO/2023/3)	Temporary haul road to facilitate the delivery of Abnormal Indivisible Loads (AIL) during the construction of the Keadby CCS Power Station, authorised by the Keadby 3 Development Consent Order 2022.	No – this haul road would only be constructed if the Keadby CCS Power Station project is advanced. The Proposed Development serves as an alternative to Keadby CCS, and the haul road is not required as part of the Proposed

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			Development, so would not be constructed should this project be progressed.
18	PA/2023/58 (following EIA screening request PA/SCR/2023/3)	Battery energy storage system. Potential for overlap in construction periods.	No – small scale proposal that would not meaningfully add to or be distinguishable from construction activities for the Proposed Development.
19	PA/2022/77	Residential development of 28 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location and small-scale nature of the proposal. No likely interface with qualifying features given the site and development context.
20	PA/2022/116	Proposed development of roadside services including petrol filling station, electric forecourt and ancillary retail. Potential for overlap in construction periods.	No – located within an existing developed setting and small-scale nature of the proposal. No likely interface with qualifying features given the site and development context
21	PA/SCR/2021/8	EIA screening request relating to a proposed 49.9MW solar farm. Potential for overlap in construction periods if planning application submitted and approved. Located on farmland immediately adjacent to the Proposed Development.	No – if implemented this application would preclude potential for a construction impact from the Proposed Development, as it would remove the farmland habitat that could support foraging by a limited suite of qualifying bird species. That stated, as explained in Section 6, there is no

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			<p>data that indicates a functional importance of this farmland for qualifying bird species. There is no potential for an in-combination impact during operation, the Proposed Development would not affect qualifying features even if habitat remained for these species (and it is not likely to remain).</p>
22	PA/SCR/2021/7	EIA screening request relating to the creation of a new solar farm. Potential for overlap in construction periods. Located on farmland immediately adjacent to the Proposed Development. Located on farmland immediately adjacent to the Proposed Development.	As above.
23	PA/2020/1790	Residential development. Potential for overlap in construction periods.	No – located within an existing developed urban edge location and small-scale nature of the proposal. No likely interface with qualifying features given the site and development context.
24	PA/2019/1940	Substation alterations	Small scale works within an existing substation, and believed to have been completed.
25	PA/2024/172	Outline planning permission for up to 19,000sqm of employment development (use class E(g) and B8) with associated internal infrastructure and	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context.

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
		access. Potential for overlap in construction periods.	
26	PA/2023/1750	Residential development of 158 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context. Unlikely due to distance from the Site (4 km).
27	PA/2023/1124	Residential development of 599 dwellings plus a lake. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context. Unlikely due to distance from the Site (3.55km) and proximity to motorway.
28	Industrial warehouse PA/2020/1510	Erection of a warehouse. Potential for overlap in construction periods.	No – small-scale and located within a developed site.
29	PA/2020/2049	Residential development of 158 dwellings. Potential for overlap in construction periods.	No – located within an existing developed urban edge location. No likely interface with qualifying features given the site and development context. Unlikely due to distance from the Site (4.6km).
30	PA/2021/1171	SEND school and associated facilities. Potential for overlap in construction periods.	No – small development within an urban area.

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
33	PA/2024/123	Scunthorpe Electric Arc Furnace. Hybrid application comprising full planning permission for the construction of a new electric arc furnace and compressor building and outline planning permission for ancillary plant buildings and structures. Potential for overlap in construction periods.	No - located within an existing industrial site on the eastern fringe of Scunthorpe. No likely interaction with qualifying features.
34	Project Union	Project Union involves repurposing parts of the 5,000-mile gas National Transmission System (NTS) to carry 100% hydrogen. It will initially create local transmission networks to link strategic hydrogen production and storage sites with industrial clusters. Eventually, these regional networks will be connected to create a 1,500-mile hydrogen transmission network across Great Britain. No planning application exists at present for this development however the development is required for the Proposed Development.	<p>No - Scoped out for in-combination assessment.</p> <p>If consented, there could be an overlap in construction periods (although this is not certain given no planning application exists), dependent on the location where works commence and the speed of progression.</p> <p>There is no information to inform a robust in-combination assessment, and it is not appropriate to undertake a speculative assessment. For example, <i>Finch v Surrey County Council (2024)</i> where the UK Supreme Court ruled that an EIA must consider the "effects of a project," which requires establishing causation based on full information stating "<i>Conjecture and speculation have no place in the EIA process. Thus, if there is insufficient</i></p>

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			<p><i>evidence available to found a reasoned conclusion that a possible environmental effect is “likely”, there is no requirement to identify, describe and try to assess this putative effect”</i></p> <p>Further, in relation to Sahota v Herefordshire Council (2022) the Court of Appeal upheld the planning permission, emphasizing that a competent authority must base its judgment on objective information and that the authority's decision should not be irrational or based on insufficient evidence. Therefore, it is considered that it would be for this development to make an in-combination assessment with reference to the progression of the Proposed Development at that time.</p>
36	PA/SCR/2024/10	EIA screening request proposed development for circa 1,200 dwellings, a local centre and school, green infrastructure, drainage infrastructure, open space and associated highway infrastructure at land West of Scotter Road, The Lakes, Scunthorpe.	No - this development would be part of the ‘Lincolnshire Lakes’ project. A comprehensive ecological strategy was developed to ensure that the development aligns with environmental sustainability goals and complies with legal requirements, including the Habitats Regulations. Given this, any impact from the

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			<p>project on European Sites is fully mitigation and in-combination effects are not likely to arise.</p>
37	PA/SCO/2025/6	EIA scoping request for proposed development for circa 1,200 dwellings, a local centre, school, green infrastructure, open space and associated highway infrastructure.	<p>No - this development is part of the 'Lincolnshire Lakes' project.</p> <p>A comprehensive ecological strategy was developed to ensure that the development aligns with environmental sustainability goals and complies with legal requirements, including the Habitats Regulations.</p> <p>The Lincolnshire Lakes is identified in the adopted Core Strategy (2011) as "<i>a sustainable urban extension to the western side of Scunthorpe to meet identified housing needs to support projected population growth</i>". The sustainable extension is identified as a fundamental part of the strategy. The Core Strategy concludes the Lincolnshire Lakes development will be delivered through an 'Area Action Plan' (AAP). The AAP allocates land and provides a detailed planning and implementation strategy in compliance with Core Strategy policies."</p>

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
			<p>The HRA for Lincolnshire Lakes concluded “<i>Lincolnshire Lakes AAP will not lead to any likely significant effects on the Humber Estuary SPA or Ramsar site through loss of supporting habitat of value to designated bird species</i>”.</p> <p>Given the above, any impact from the project on European Sites is understood to be mitigated and in-combination effects are not likely to arise. If a HRA is still required for this phase of the Lincolnshire Lakes project, then it would be for this development to make an in-combination assessment with reference to the progression of the Proposed Development at that time.</p>
38	PA/2025/254	Hybrid planning permission comprising of outline, with all matters reserved for up to 550 dwellings, a local centre (use Class E), associated landscaping, drainage and other infrastructure works	No - this development is part of the ‘Lincolnshire Lakes’ project. A comprehensive ecological strategy was developed to ensure that the development aligns with environmental sustainability goals and complies with legal requirements, including the Habitats Regulations. Given this, any impact from the project on European Sites is fully mitigation <u>mitigated</u> and in-combination effects are not likely to arise.

ID	Application reference	Brief description	Scale and nature of development likely to have a significant effect?
39	PA/2024/1472	Reserved matters application for PA/2020/1790.	No- PA/2020/1790 is covered above (ID 23).
40	PA/2024/1459	Erect 41 dwellings, including associated landscaping, infrastructure and access	No – small development within an urban area.